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Original Communications.

*THE TREATMENT OF ACUTE INTUSSUSCEPTION IN YOUNG CHILDREN FROM THE STANDPOINT OF THE PHYSICIAN.**

BY FREDERICK A. PACKARD, M.D.,
Philadelphia.

I am led to write what follows partly by the comparative infrequency of intussusception, and chiefly by the fact that I refrained from employing the usual methods of treatment that lie within the field of internal medicine as opposed to that of surgery. Justification for this course was found at operation, and my study of the literature of the subject showed plainly to me that the danger that I apprehended from non-operative mechanical interference was one that must not infrequently be present.

In contributing this case to the list of cases of intussusception I have selected from the large mass of literature a few cases that illustrate the points I wish to make, without endeavoring to add to the large number of statistical tables and articles dealing with this disease.

In regard to the frequency of intestinal invagination, I may state that since the foun-

* Read before the Philadelphia Pediatric Society, Nov. 8, 1897.

dation of the Children's Hospital of Philadelphia, about forty years ago, no case of intussusception is found among the 7932 patients admitted to the wards before 1897. During the current year two cases have been admitted—one which came to the hospital during Dr. Griffith's term of service, the other which furnished the specimen shown to-night.

The child was a breast-fed girl aged eight months. She was first examined by me on September 18, two days after her admission to the Children's Hospital. She had then been ill for five days. The family history presented no features of interest. Until four weeks before her admission she had always been well and strong. At that time she began to have diarrhea and vomiting, her stools being bloody. These symptoms continued for ten days, during which time she was under treatment by a homeopath. At the end of the time mentioned she became better, but seems to have never entirely recovered her health. On September 13, three days before admission, the child began to vomit after nursing and diarrhea again set in, the stools being composed of blood and mucus. The number of movements was not excessive, there being but three on the day before admission. When brought to the hospital her temperature was 102° F., pulse 130, respiration 40. It was described by the resident physician as a well nourished baby with pale skin and mucous membranes, but without signs of rickets. The head was held slightly flexed, the neck muscles rigid, the pupils equal and natural. The two lower central incisors are noted as just emerging through the gum. She was perfectly conscious, but moaned a great deal, and the eyes were kept in constant motion from side to side. The lungs and heart were normal, the abdomen not distended but quite hard. It was at once given a drachm of castor oil, the bowel was cleansed by irrigation, and albumen water was ordered as the dietary. During this first afternoon there was one movement, which contained blood. That evening her temperature rose to 104° F. and continued at that point throughout the night. Before morning there were two watery, brown movements containing mucus. On the morning of the 17th the temperature was still 104° F., the pulse 120, respiration 24. During this day and the following night the child vomited all food taken (albumen water) and had five brown bowel movements containing blood and mucus. When my attention was called to the child on the 18th it was lying on its back, slightly inclined toward the left side. The cheeks looked sunken, the eyes heavy and dull with dark rings beneath. The skin and mucous membranes had a deadly pallor, but the pulse was of fair force and volume. The tongue was dry and coated. Examination of the thorax revealed nothing abnormal. The abdomen was slightly retracted, but the walls were relaxed and soft. No visible tumor was present, but by palpation there was found a mass extending from the costal margin to the iliac crest far over on the left side. The tumor was distinctly curved in shape, the concavity being toward the right; it was slightly movable, but did not vary in shape, size or consistence during examination. During manipulation the child occasionally gave a slight whimper, but there was evidently no severe pain produced by the examination. The right iliac fossa gave a decided feeling of comparative emptiness. On removing the diaper the anus was seen to be widely open, and a fringe of rectal mucous membrane projected beyond it. The sphincters were completely relaxed. Digital examination of the rectum revealed a tumor of soft consistence, situated about one and three-fourths to two inches above the anus, readily outlined by the finger, and with a slit-like orifice easily admitting the finger-tip at its extremity. The diaper contained a dark semi-fluid stool having an almost putrid odor and evidently composed in great part of blood. There was a slight admixture of mucus, but no recognizable fecal matter.

For reasons that will be given below I decided not to endeavor to reduce the invagination by injections or inflation, but communicated with Dr. R. G. Le Conte, at the time acting as surgeon to the hospital; and on finding that he could operate at an early hour, turned the case over to his care.

Dr. Le Conte has kindly furnished me with his notes of the operation in order that I might incorporate them with this report. At 4 P.M. on the 18th of September Dr. Le Conte had the child etherized, and then made an incision in the median line below the umbilicus to the extent of one and three-fourths inches. The mass felt in the left loin could be easily brought up to the surface of the wound. The intussuscipiens was formed by part of the transverse and the descending colon, the intussusceptum of the small intestine, cæcum, ascending and part of the transverse colon. Reduction was comparatively easy until the withdrawal reached a point

within an inch of the cæcum, when a considerable amount of force failed to advance it further. While Dr. Le Conte was attempting the reduction an assistant used upward pressure by a finger in the rectum. After some further manipulation, aided by passing a finger along the intussusceptum and separating it from the sheath as much as possible, the cæcum was finally delivered by firm traction. An enlarged mesenteric gland of the size of an almond was probably the cause of the difficulty. The peritoneum covering the invaginated gut showed spots of roughening, with absence of gloss. The invaginated bowel was dark in color, resembling liver, and the mesentery was very dark and much congested. Two perforated ulcers were found in the ascending colon a short distance above the cæcum. They were sharply defined, oval in shape, punched out, and with an opening on the serous side smaller than that in the muscular coat. The edges of the ulcers were very dark. No extravasation of fecal matter had occurred through these openings, and the surrounding peritoneum showed no sign of inflammation. The ulcers were closed with a continuous Lembert suture of fine silk and the abdominal wound sutured. The operation occupied about thirty minutes.

After the operation the child's condition was very bad, the skin being pale and "leaking," the pulse very rapid and weak. The temperature was 100° F., the respiration shallow and rapid. Death occurred about three hours after operation.

No general autopsy could be obtained, but permission was granted to reopen the abdominal wound. There was no sign of general peritonitis. The cæcum and ascending colon lay to the left of the median line. The specimen presented was removed and may be described thus: It consists of a small portion of the ileum, the vermiform appendix, the cæcum, and the colon as far as the splenic flexure. The transverse and ascending colon are much thickened, especially as regards the submucous coat. High up in the ascending colon, near the hepatic flexure, there are two lines of sutures representing the points of rupture found at operation. The serous coat of the large bowel is quite rough, especially toward the caput coli. On the anterior surface of the specimen, at the junction of the ileum and cæcum, is a layer of material looking like organized lymph. The invagination is thoroughly reduced. The ileocæcal valve is thickened, and its broad lips project fully four millimeters into the cavity of the cæcum. There is decided thickening of the wall of the cæcum surrounding the valve.

To my mind there are several points of interest in the case. In the first place the diagnosis was easy because of the presence of bloody stools, a tumor readily palpable and of characteristic shape on the left side of the abdomen, and an easily recognized mass in the rectum. It is possible that this was a case of spontaneously reduced invagination with relapse. In spite of the presence of vomiting and bloody stools during the earlier attack, there was no other sign or symptom that could be found by questioning the mother, and that would warrant such a diagnosis. That such a late recurrence might occur is possible, Holt stating that in his collection of cases recurrence was noted in six per cent., and that while it was most common in the first twenty-four hours after reduction, it may occur at as long an interval as a month.

In this case there was no family tendency to the disease, such as has been noted by some authors (Bryant, Hirschsprung, and others).

As the child was first seen by me on the fifth day of its illness I endeavored to picture to myself the probable condition of affairs within the abdomen. This I felt must guide me in my course of treatment. I decided that by that time the invaginated intestine must have become much swollen from prolonged stasis of blood; that adhesions between the serous surfaces of the inner and middle cylinders had almost certainly formed; that sphacelation might already have begun from pressure upon the mesenteric vessels of the intussusceptum at the neck of the invagination; and that ulceration of the intussusceptum or of the sheath might very likely be present. I therefore decided that an attempt to reduce the invagination by injection or inflation would be fruitless because of adhesions, and dangerous because of the risk of perforation of the weakened and possibly ulcerated or sloughing cylinders. I therefore sent word to Dr. Le Conte that I considered the case one where the interference of the surgeon was alone justifiable. That such was the case is shown by the operation. Reduction by injection or inflation would have been impossible, not only because of the adhesions between the serous layers but by reason of the presence of the enlarged lymph node found at operation and seen in the specimen; while it would certainly not have saved life even if the invagination could have been

reduced, owing to the presence of the ulcerations that could not have been detected except at operation or autopsy.

Certainly but a short time must elapse after the formation of an intussusception before there is marked constriction of the blood-vessels (especially of the veins) of the intussusceptum. Not only is the mesentery necessarily crumpled up within the sheath, but there is so much distortion of the mesentery of the inner cylinders at the point of entrance that the return flow of blood must be rapidly and seriously diminished. Such a sudden interference with circulation must produce marked swelling of the intussusceptum from engorgement of the blood-vessels and from transudation into the tissues. At the same time the intussusceptum tends to become turned upon itself owing to the fact that the mesentery going to the apex is in a state of greater tension than is that of the proximal portion of the gut. According to Treves the thickening of the intussusceptum may be universal, but is usually most marked at the apex and along the convexity. The opposed serous surfaces covering the inner layer of the middle cylinder and the outer layer of the inner tube are in close juxtaposition and are placed in circumstances readily leading to the formation of adhesions. Prolonged interference with the blood paths leads to impairment of vitality in the two inner cylinders from faulty nutrition and from mechanical separation of their component parts by transudation from the engorged vessels. Sooner or later loss of substance occurs from either ulceration or sphacelation. According to D'Arcey Power, the stress of the trouble is borne most often by the submucous tissue and by the circular layer of muscle, the longitudinal muscular and serous coats being least affected. The sheath may not entirely escape, as in some cases it is found ulcerated, at times at many points. The impact of the apex of the intussusceptum may be sufficient to produce local ulceration of the sheath, which may perforate. General peritonitis, however, is not frequent, partly no doubt because the diseased mass is usually, so to speak, encapsulated by a fairly healthy cylinder whose mesentery has suffered no damage. The small amount of involvement of the sheath and the obstruction of return flow from the intussusceptum may limit the spread of the colon bacillus and other organisms, in that way accounting for the fact that Holt found among fifty-eight collected autopsies only twenty cases showing peritonitis, in seven of which it was limited to the intussusception, while in seven there was perforation.

The conditions militating against reduction are, then, swelling of the intussusceptum, bending of the intussusceptum upon itself, cohesion of the entering and returning layers, adhesion of the serous surfaces in contact, and finally (a point brought out clearly by Braun) plication of the sheath near the point of entrance, whereby the sheath is much thickened and the neck of the sac rendered more rigid. In the case herein reported there was a still more powerful impediment to reduction in the enlarged mesenteric gland. I have nowhere seen this mentioned as a cause of irreducibility, yet it is easy to conceive of the possibility of its frequency. In the ileocæcal form, with which alone I have dealt, the swelling of the lips of the ileocæcal valve forms a distinct obstacle to reduction. The mechanism of this obstruction can be well seen in the specimen.

Statements regarding the time at which the various changes in the intussusceptum take place vary widely. Most authors state that the earliest time for the formation of adhesions is the third day, although many give the fourth as the usual time. They are, however, often absent at an even later time. Sphacelation is usually a rather late event, of necessarily variable rapidity and degree in different cases, although Jalaguier states that it generally first shows itself at the end of from two to three days, while Wiggin cites a case with gangrene of the gut twenty-eight hours after the onset, and Broca encountered gangrene at the end of thirty hours.

The exact time of occurrence of these various accidents which may prevent reduction or render it dangerous when performed without inspection of the parts involved cannot be laid down absolutely. A few cases from literature will serve to show this uncertainty in time of development. Mortimer, in a three months' old child which died thirty-six hours after the onset of an intussusception that was supposed to have been reduced by insufflation, found already a little soft lymph at the point of reflection and some injection of the sheath. D'Arcey Power describes a specimen removed from a nine months' old child dead thirty-six hours after the onset of the illness. There was very little, if any, thickening of the mucous membrane, but the surface was covered by a layer of coagulated blood.

There was edema of the whole submucous layer and also extravasation of blood and formation of inflammatory products therein. The veins of the submucosa were congested, and this layer contained many huge capillaries. There was also edema of the circular and longitudinal layers of muscular tissue. Adhesions throughout the whole extent of the adjacent serous surfaces of the inner and middle cylinders were found by Rotch in a case dead on the third day. In a child aged eight months that had been ill for three days with intussusception, Power found all parts of the invaginated intestine seriously damaged, with great congestion of the blood-vessels, round-celled infiltration, extravasation of red blood cells, and dense adhesions between the serous layers of the two inner cylinders. Bryant records a case in a child aged six months admitted on the second day of the disease. On the day after admission (only the third day of the illness) death resulted promptly after insufflation of the bowel with air; and at autopsy there were found two perforations, one at the splenic, the other in the sigmoid flexure. Pilz found a small oval opening near the beginning of the intussusception which had perforated into the peritoneal cavity and caused death on the fourth day of the disease. In Wiggin's paper perforation is stated to have been present in two of his cases on the fourth day, although in both of these injections had possibly caused the lesion and the cases should not be considered in estimating the lesions present on the fourth day of the illness. Mortimer records a case wherein gangrene was established on the fifth day, to offset which a case is reported by Wiggin where adhesions were absent although the lesion had existed for the same length of time. Bryant records a case of ulceration present at the point of constriction at the entrance on the fifth day of the disease, and another wherein on the seventh day there was sloughing of the mucous membrane near the ileocæcal valve without any adhesion between the serous layers. Mortimer gives a case dead on the eighth day with three ruptures in the descending colon, one of which had rounded edges as though several days old.

It will be seen from these examples how variable is the extent of pathological changes in different cases at various periods after onset. Unfortunately without actual inspection of the parts involved we have no means for exactly estimating the conditions that may be present in a given case.

It would seem from the examples selected that practically at no time can we be absolutely sure that no contraindication to an attempt at reposition exists. As a matter of fact, however, there is a sufficient number of cases reported of cure following injection or inflation to make it advisable to attempt reduction by these measures during the early course of the disease.

The question as to the period during which it is justifiable to resort to mechanical (non-surgical) methods by distention of the bowel is important, not only from the standpoint of probable success or failure, but also in regard to safety. A few opinions in regard to this point may be selected. Eustace Smith says that mechanical interference is only permissible during the first few days and is useless if the mass be tender. Ashhurst says that injections are most likely to be successful in the first two days, but after that period should not be tried. Rotch states that in "the early hours" attempts should be made to reduce by hydrostatic pressure. Starr gives the first four days as the limit of time for the use of distention, but not even then if the mass be tender. Holt says that if three or four days have passed without symptoms indicating strangulation, it is admissible to try more than two inflations at intervals of three or four hours. Keen gives the first forty-eight hours as the time during which alone distention can do good, and that after that time has elapsed there is danger of rupture. Monti says that better results occur in early cases than in those existing for many days; nevertheless he holds "as fully justifiable the view already pronounced by authors to in all cases try water irrigation or air insufflation." Jalaguier says that distention is only to be tried if the case is seen at the onset. Leichtenstern rather vaguely states that "if the invagination has lasted for some time, if it has become fixed and chronic, or if there are signs of gangrene and impending separation, if general peritonitis or perforation is present, no prudent physician will make any attempts at reduction."

It may be said, then, that all mechanical attempts at reduction should be performed with the greatest care and gentleness, that they should be employed at as early a time as possible, and that after the third day they promise but little success and are capable of doing great damage.

At the present time no one would venture to support the plan of allowing (in young children) Nature to effect a cure by separa-

tion of the intussusceptum—a plan that has, according to Treves, a death-rate of forty per cent. among the forty-two per cent. in which separation takes place when the case is left to Nature. According to Widerhofer, among the forty-six cases of the combined tables of Leichtenstern, Pilz, and himself, where separation occurred, seventeen died, twenty-seven survived, while in two the result was unknown; and, he adds, even in these so-called cases of recovery death usually occurs in from one to two years. In very young children (and especially in infants) death may be expected before Nature has had time to cast off the slough.

All authors are in accord regarding the use of opium before all non-sanguinary efforts at relief, although the exact form and channel of administration advised differ somewhat. Thus, Eustace Smith and Rilliet and Barthez advise the subcutaneous use of morphine, while almost all other writers recommend the use of opium or laudanum by mouth or rectum. Monti has urged the employment of a warm bath for its relaxing effect before any measures are employed. Anesthetization by chloroform or ether is universally advocated.

Considerable difference of opinion exists regarding the advisability of employing abdominal massage as an aid in reduction. Thus, Hirschsprung recommends that it should be tried before injections are employed, while Jalaguier condemns it as useless and dangerous. It is difficult to appreciate in what way it could be of great value, while the danger of exciting peristalsis, and so defeating its object, would seem to contraindicate its use. Of the various media for use in the mechanical reduction by distention may be mentioned water, air, olive oil, milk, thin gruel, and normal salt solution. Of these water and air are most generally recommended. Whatever medium may be selected, it is important that we should be able to accurately measure the amount of force that we are employing. This is most easily calculated in the case of water or watery solutions entering by gravity, and is practically impossible in the case of air or gases unless we happen to have at hand a compressed air apparatus or cylinder with pressure gauge. The use of solutions, union of which in the bowel will cause the evolution of gas, must manifestly be extremely dangerous inasmuch as we have no means of estimating the distending force exerted upon the bowel wall.

It must be remembered in using fluids that the pressure exerted by them acts equally in all directions and that, unlike a solid means of reposition, such as the discarded and in practically all cases useless sound, it does not simply exert its force in the direction of the lumen of the bowel. The advantage which this property gives is that, while pressure is exerted at the apex of the intussusceptum, the sheath is at the same time distended, thereby removing it from the intussusceptum and thus aiding the retrogression of the latter. The very fact of this lateral as well as forward pressure is, however, a distinct source of danger.

The most rational fluid for use, to my mind, is normal salt solution, owing to the fact that it is readily obtainable, is bland enough to prevent any irritation save by its bulk, and causes no disturbance by osmosis.

The temperature of the fluid used is a question whereon there is some difference of opinion. Most authors recommend the use of warm water (100° to 105° F.), but no less an authority than Baginsky states that it is better to use cold than warm water. Monti, the strongest advocate of the use of iced water enemas, begins irrigation with tepid water and at the conclusion of the process uses a half to one liter of iced water in order to induce peristalsis while pressure is high and to so reduce the invagination. He relates the case of a seven months' old child, seen on the fourth day of its illness, where repeated failure followed the use of the sound and injections of tepid water, but on the sixth day the injection of a liter of iced water was successful. Elliott mentions a case in which inflation with air and injection with warm water failed, but an enema of iced water was successful on the second day of the disease. Henoch relates several cases in support of this plan, but in some of his cases the diagnosis must be considered doubtful, as he himself seems to admit. Iced water is condemned by Leichtenstern, who ranks it with turpentine and carbonic acid water as promoters of peristalsis. In this connection the question suggests itself whether peristalsis under any circumstances can aid in the reduction. If we grant the possibility of reversed peristalsis (anti-peristalsis) we can see how possibly such movement might aid in reduction; but it has not been proven, so far as I can find, that we can by iced water or by any other means start such a reversion of the intestine within the unopened abdomen. If reversed peristalsis is not excited by iced

water enemata the tendency would be for the excitation of peristalsis to cause further propulsion of the intussusceptum into the sheath. The volume pressure of fluid injected would probably neutralize this tendency to forward projection, in which case any good effects of peristalsis, such as are claimed by Monti, would be overcome. Peristalsis, according to the experiments of Cash, is a comparatively weak force, overcome in the dog by an opposition of from five to eight grammes. This, however, may not apply to an intestine in which excessive peristalsis is stimulated not only by the lesion present but also by the cold injections. If, therefore, the peristalsis is thus neutralized, it is difficult to explain any advantage to be derived from the use of iced water enemata, inasmuch as their property of coldness might seriously depress the vitality of the patient, and it is inconceivable that cold or any other astringent could diminish the size of the intestinal plug.

In giving enemata the position of the patient is a point of importance. The position usually advocated is that on the back with the hips elevated and the patient turned slightly toward the left side. Monti recommends the knee-elbow position; others, among whom is Baginsky, advise the inversion of the patient, a procedure characterized by Treves as "a violent measure which neither on theoretical nor on practical grounds has anything to recommend it."

It can be readily appreciated that one of the most important things to observe in the use of fluid pressure is the avoidance of such force as to cause rupture of the bowel. It is also necessary to bear in mind that the longer the lesion has persisted, the more marked are the tissue changes in the bowel wall and the greater is its liability to rupture. The exact determination of the resisting power of the wall of the bowel in an individual case cannot be determined, yet the supposition that the younger the lesion the higher the breaking-strain must be accepted as in general true. In order to determine the resisting power of the intestine to pressure, experiments have been tried upon the cadaver by various authors. Inasmuch, however, as the subjects used died from lesions unconnected with the intestinal tract, a few only will be mentioned here. Forest found that in the body of a child a few months old, after ligating the ileum a pressure of nine and three-quarter pounds to the square inch was required to rupture the transverse colon at the middle of its anterior surface, and that when the small intestine was thus ligated in other subjects the point of rupture was never at the seat of obstruction, but in the colon. When the ileum was not ligated, in a case dead of marasmus, he says that "it seemed almost impossible to rupture the intestine by pressure, so long as the nose or mouth was pervious"—a condition that for practical purposes does not exist in intussusception, where the large bowel is occluded above the seat of pressure by the invaginated plug. Mortimer, on the other hand, in his experiments upon two-year-old children in the post mortem room, found that a pressure of two and a half pounds (five feet elevation) was apt to cause "cracking of the peritoneum," an occurrence that usually took place when the reservoir was raised to eight feet, and that at an elevation of six feet there might be complete rupture of the bowel. Mole found that in a child aged five years the colon ruptured after the passage of five pints of water at a pressure of four feet. These experiments, it must be remembered, were made upon children without grave intestinal lesion. More instructive, for our purpose, is Mortimer's experiment upon a child dead of intussusception. The patient, aged three months, was treated with supposed success by inflation. Death occurred at the thirty-sixth hour. A tube was passed into the rectum and connected with a reservoir at a height of two feet. In a few minutes there occurred partial reduction of the invagination. After fifteen minutes the irrigator was raised to three feet; this caused a slight increase in the reduction, but soon stopped, and in four minutes the colon ruptured in three places just below the invagination.

In using irrigation the fountain syringe is certainly preferable to those depending upon hand pressure, which is necessarily intermittent and incapable of measurement, while the steadiness of hydrostatic pressure prevents excitation of peristalsis and diminishes the danger of rupture from sudden increase of pressure. The height to which the reservoir should be raised is a question of importance. The extreme elevation that I have found recommended is that by Forest, who says that six pounds to the square inch (an elevation of fifteen feet) is safe within three or four days of the inception of the attack. The same author recommends, as preferable to performing laparotomy or depending upon cure by sloughing in children under six years

of age, a pressure of six pounds to the square inch, or, if this fails, to raise the pressure to eight or even nine pounds (twenty to twenty-five feet elevation). Most authors, however, are more moderate, and are unanimous, so far as I have consulted them, in condemning any elevation greater than eight feet, and usually recommend an initial elevation of three feet with a gradual increase in the height of the reservoir up to the point mentioned. Some authors recommend the higher pressures for the cases of greatest duration, the reverse, to my mind, of what pathology would teach as the proper rule.

The time after onset at which injection is practised has much to do with the success or failure of the method. Thus, Eccles has tabulated twenty-one cases in children. The number is small, but the effect striking. One of these was treated on the first day and recovered (recovery in 100 per cent.); six were treated on the second day, of which four recovered (recovery in sixty-six per cent.); eight were treated on the third day, of which two recovered (recovery in twenty-five per cent.); six were treated on the fourth day, of which none recovered. Holt has collected forty-six cases cured by injections or inflations. Of these, sixteen were treated on the first day, fifteen on the second, three on the third, eleven on the fourth, and one on the fifth day. Of the sixteen cases successfully treated by distention in Wiggin's table none were of more than three days' standing, the average time of cure being on the forty-first hour, while twenty-three cases that died had an average duration of sixty-nine hours.

That rupture can readily occur from distention is shown by cases related by Bryant, Wiggin, Mortimer, Widerhofer, and many other writers of analytical papers and monographs, as well as by many isolated reports in the medical journals. How many times the bowel has been ruptured by injections and inflations and the case not reported cannot even be surmised.

To return to my case, the subject of this paper. It is evident from the account given by Dr. Le Conte that an injection would have probably caused immediate escape of the fluid into the peritoneal cavity through the perforations found at operation. It is quite possible that, even if the bowel had not perforated, reduction could not have been completely effected owing to the presence of the enlarged mesenteric gland, and that a false assurance of successful reduction might have prevented the undertaking of further attempts to save the child's life. It may be said that the child died at any rate. That is true, but it died after the best course in our opinion had been adopted; and I have not the uncomfortable knowledge that by my treatment I produced perforation of the bowel in a case that might have been saved.

It might be judged from what I have written that I do not believe in endeavoring to effect reduction by distention of the bowel. Such is not the case; but I do believe that injections are dangerous and oftentimes useless after the third day; that before that date, unless otherwise contraindicated, it is proper to attempt reduction by the use of one thoroughly executed injection, upon failure of which surgical aid should be at once summoned without loss of time from further attempts by a procedure that should be thoroughly and conscientiously applied in the first instance. I wish finally to protest against such a procedure as that advocated by one author, to keep the child in the hallway and to carry the reservoir of the irrigator up the stairway. The height of the ceiling of an ordinary room is more than enough to allow of the reservoir being elevated sufficiently to rupture the healthy bowel, to say nothing of an intestine seriously damaged by disease.

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THE REAL VALUE OF THE BRAND BATH IN TYPHOID FEVER.

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As its title indicates, the object of this paper is to discuss the real value of the cold bath treatment of typhoid fever by a study of the statistics and facts which are now before the profession concerning it. It is sometimes wise when a plan of treatment seems to be particularly effective to analyze its results to determine its real value, for as Cabot has well said recently in a paper on the routine use of alcohol in fevers, the progress of therapeutics is seriously hindered by the fact that every case is given the best treatment known, and so we are satisfied with it. We desire to state at the outset that we fully recognize the great usefulness of the cold bath of Brand, although it may seem in the course of our paper that we are attempting to cast discredit upon it. On the contrary we desire first to determine its actual value, and second to inquire whether its routine use is wise.

When the physician begins to study this subject he is met by the statement that the mortality, which was at one time no less than twenty-five per cent., can be reduced by the cold bath to from ten to seven per cent. As a matter of fact a mortality of twenty-five per cent. has not been commonly met with for many years, and the largest body of statistics yet collected giving this death-rate are those made in Germany and France many years ago, when the disease was particularly virulent, when only severe cases were recognized and classified, and further, when owing to what may be called barbarous treatment the patients who survived fought their way against infection and treatment. Further, hospital facilities were comparatively poor, nursing ineffective, and sanitation wretched.

That severe cases chiefly entered into these statistics is proved by the statements of Griesinger and Strümpel, who point out that numerous light and rudimentary attacks (typhus levissimus) were not recognized till lately as belonging to typhoid fever at all.

That the treatment was calculated to increase the mortality is shown by Vogl's statement that it consisted in venesection, emesis and catharsis, and free use of mercury. That the hospital facilities were wretched in many instances as compared to those of to-day is notorious (see Baas, History of Medicine), and the history of individual cases and the results of the analysis of large bodies of statistics impress upon us the important fact that among the poor who have not hospital care, and in armies where the patients are not cared for when in the field as is possible when at home, the death-rate is very high and the signs of disease severe.

Improvement in sanitation has decreased the frequency and mortality of this disease remarkably, as is shown by statistics.

Mosny has shown that the death-rate of Vienna decreased from 12.05 per 10,000 to 1.1 after a pure water-supply. In Dantzic the mortality has fallen from 10 per 10,000 to 2.4, and finally to 1.5 per 10,000. In Stockholm it has fallen from 5.1 in 1877 to 1.7 in 1887. So too in Boston from 17.4 in 1846–49 to 5.6 in 1870–84.

The following table is of interest in this connection:

MORTALITY IN MUNICH FROM 1851 TO 1873.

Year.	Inhabitants.	Annual.	Per 100,000 Inhabitants.	Year.	Inhabitants.	Annual.	Per 100,000 Inhabitants.
1851	123,957	123	99.0	1874	181,300	289	159.0
1852	125,588	152	121.0	1875	187,200	227	121.0
1853	127,219	235	184.0	1876	193,024	130	67.0
1854	128,850	293	227.0	1877	205,000	173	84.0
1855	130,481	253	193.0	1878	211,300	110	55.0
1856	132,112	384	291.0	1879	217,400	236	109.0
1857	133,847	390	291.0	**1880**	223,700	160	72.0
1858	135,733	453	334.0	1881	230,028	41	18.0
1859	137,005	240	175.0	1882	236,400	42	18.0
1860	140,624	153	109.0	1883	242,800	45	19.0
1861	144,334	172	119.0	1884	249,200	34	14.0
1862	148,200	300	202.0	1885	255,600	45	18.0
1863	154,602	252	163 0	1886	262,000	55	21.0
1864	160,828	397	247.0	1887	268,400	28	10.0
1865	167,054	338	202.0	1888*	292,800	31	10.5
1866	168,265	342	203.0	1889	306,000	31	10.1
1867	169,476	88	52.0	**1890**	331,000	28	8.5
1868	170,688	136	80.0	1891	357,000	24	6.4
1869	170,000	190	111.0	1892	372,000	11	3 0
1870	170,000	254	149.0	1893	385,000	57	14.8
1871	170,000	220	129.0	1894	393,000	10	2.5
1872	169,693	407	240.0	1895	400,000	15	3.7
1873	175,500	230	131.1	1896	412,000	14	3.4

*This table is taken from Pettenkofer's "Munich a Healthy City" up to 1887 inclusive; after 1887 from returns obtained from the Statistical Bureau.

The effect of improved sanitation is to decrease the virulency of infection, and for this reason there follows a decreased severity of illness and a decreased percentage mortality.

For these reasons then we shall exclude the statistics of 1840, 1850 and 1860 from comparison and confine ourselves to more recent statistics more suitable for this purpose. This is the more important when we discover that the frequency, severity and mortality of typhoid fever is steadily de-

creasing all over the world, as is shown by the following interesting tables of Dreschfeld in regard to England in general and London and Manchester in particular:

ANNUAL MORTALITY, PER MILLION PERSONS LIVING, FROM FEVER IN ENGLAND.

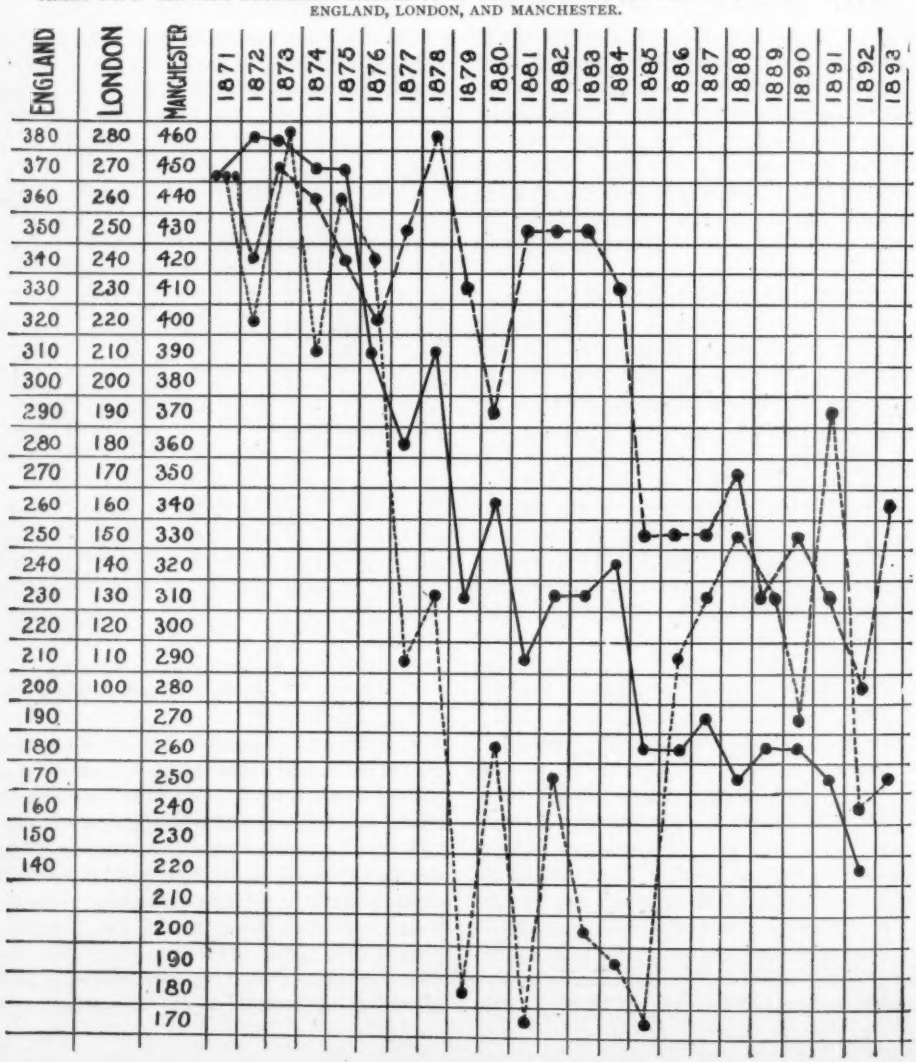
Period.	Enteric Cases.	Period.	Enteric Cases.	Period.	Enteric Cases.
1838	1228	1857	985	1875	371
1839	1010	1858	918	1876	309
1840	1089	1859	806	1877	279
1841	932	1860	652	1878	306
1842	1004	1861	767	1879	231
1843	....	1862	919	1880	261
1844	....	1863	874	1881	212
1845	....	1864	900	1882	229
1846	....	1865	1089	1883	228
1847	1307	1866	986	1884	236
1848	1266	1867	778	1885	175
1849	1044	1868	895	1886	184
1850	865	1869	390	1887	185
1851	997	1870	388	1888	172
1852	1022	1871	371	1889	176
1853	1008	1872	377	1890	179
1854	1015	1873	376	1891	168
1855	875	1874	374	1892	137
1856	847				

DEATH-RATE FROM ENTERIC FEVER IN LONDON AND MANCHESTER PER 1,000,000.

Year.		
1871	267	450
1872	242	400
1873	269	460
1874	256	390
1875	235	440
1876	217	420
1877	251	290
1878	283	310
1879	229	180
1880	186	260
1881	254	170
1882	252	250
1883	247	200
1884	234	190
1885	150	170
1886	154	290
1887	151	310
1888	169	330
1889	130	310
1890	146	270
1891	132	370
1892	102	240
1893	161	250

These figures are exhibited graphically in the following chart:

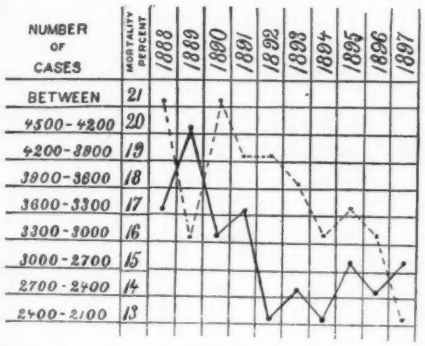
CHART NO. I.—SHOWING DECREASING MORTALITY OF TYPHOID FEVER PER MILLION PERSONS LIVING IN ENGLAND, LONDON, AND MANCHESTER.



Not only is the decrease in mortality seen in England, but in Philadelphia and New York, as follows.

The decrease in cases and in mortality is shown in the following chart in broken and complete lines (Chart No. 2):

CHART NO. 2.—SHOWING DECREASING NUMBER OF CASES AND DECREASING PERCENTAGE OF MORTALITY OF THESE CASES IN PHILADELPHIA.



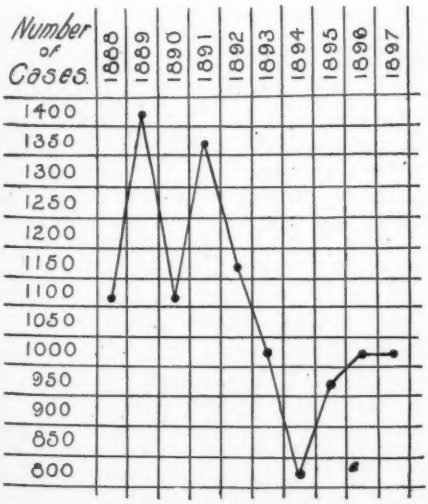
Broken line represents mortality per cent.

PHILADELPHIA.*

Year.	Cases.	Deaths.	Per cent. of mortality.
1888	3573	785	21.9
1889	4631	730	15.8
1890	3182	566	20.9
1891	3531	683	19.3
1892	2304	440	19.1
1893	2519	456	18.1
1894	2357	370	15.7
1895	2748	469	17.0
1896	2490	402	16.1
1897	2994	401	13.3

*These statistics go back as far as the comparative records extend.

CHART NO. 3.—SHOWING DECREASING NUMBER OF CASES ANNUALLY IN NEW YORK.*



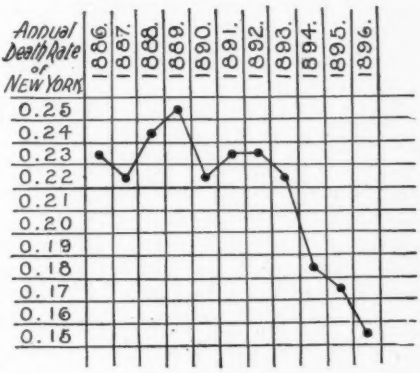
*A comparative chart of the number of cases and of mortality per cent. from these figures is not given, as Dr. Biggs, of the New York Health Office, writes that only recently have the cases been generally reported and even now many are not reported.

NEW YORK.

Year.	Cases.	Deaths.
1888	1108	364
1889	1414	397
1890	1100	352
1891	1342	384
1892	1140	400
1893	1008	381
1894	792	326
1895	965	322
1896	1002	297
1897	1004	299

The following chart from the New York Health Report shows a decreasing death-rate from typhoid fever (Chart 4):

CHART NO. 4.—SHOWING DECREASING DEATH-RATE FROM TYPHOID IN NEW YORK CITY.



When we consider that the population of these cities has increased enormously the great decrease in the disease is very notable.

These tables are supported by the statement of Billings that in Norway from 1888 to 1891 the mortality from typhoid fever was 755 in 7467 cases, or less than ten per cent. In the present Maidstone epidemic the death-rate in 1885 cases is only 7.5 per cent., and a similar mortality obtained at Plymouth, Pa. Again, in the *Gazette Médicale des Hôpitaux* of July 10, 1890, we learn that a collective investigation showed that whereas in the period from 1866 to 1881 the mortality from typhoid was 21.5 per cent., from 1882 to 1888 it was 14.1 per cent.; in 1889, 13.5 per cent.

It is evident therefore that the mortality to-day should be placed at less than fifteen per cent. as a fair percentage, the more so as many years ago Murchison placed it at 17.45 among 27,951 cases in England.

Assuming, then, that the ordinary mortality of typhoid fever is at present about fifteen per cent., the question arises, How much credit is to be given to the cold bath method for the reduction, claimed by its advocates to be about seven or eight per cent.? It is well in this connection for us to remember that a disease that cannot be aborted and which runs a definite course till it is completed will

do less damage to the patient if the case is guided through the storm so that his natural processes are not perverted than if by meddlesome or absolutely harmful treatment his organs, already bearing the burden of disease, are still further strained by the influence of unnecessary drugs and by the necessity of absorbing and eliminating them.

The best treatment for typhoid fever is to let drugs alone so far as possible. It is evident, therefore, that if a given routine is followed which is manifestly not incorrect in its fundamental details, better results will be obtained than if each physician steers his patient on a course of his own choosing, which may not only be useless but actually dangerous.

This is shown by the facts presented by Liebermeister in his well known article in Ziemmsen's Cyclopedia, in which he gives carefully prepared tables of 839 cases, of which 377 were treated non-specifically, with a mortality of 18.3 per cent.; 223 treated by full doses of calomel, with a mortality of 11.7 per cent.; and 239 with iodine, with a mortality of 14.6 per cent. If the grave cases are included in his statistics the mortality of a general plan of treatment was 25.3, those treated with calomel 16.3, and with iodine 17.2 per cent. A routine treatment here gave a saving of life nearly as great as the cold bath treatment often does, the difference between fifteen and seven per cent. Liebermeister adds that he has compared fifty cases treated with calomel, fifty with iodine, and fifty by general indefinite measures, selecting those admitted about the same time and all of whom were looked upon as grave cases in their early history. All the calomel cases recovered, and yet he rejected all cases which did not reach an axillary temperature of 104° F. or over.

Bouchard with intestinal antisepsis, quinine, cool bathing, etc., had a mortality of 11.16 per cent. as against twenty-one per cent. on the old general plan of treatment; while Mason records 676 cases with a mortality of ten per cent. under cool sponging, intestinal antisepsis in some instances, and symptomatic treatment. Under a similar plan Jaccoud lost out of 655 cases 10.8 per cent. Riess in 900 cases with the use of tepid baths had a mortality of seven to eight per cent., and under pure expectant treatment with plenty of water to drink Debove had at the Hôpital Andral 9.2 per cent. (See also Colle's statistics about to be quoted.)

Of very great interest in this connection are the results recorded by A. L. Mason in the *Boston Medical and Surgical Journal* of April 14, 1892. During 1890–91 there were treated in the Boston City Hospital 676 cases of typhoid fever, of which seventy-five were fatal, or 10.4 per cent. This includes all cases—mild, moribund, or doubtful—which entered the house. To illustrate how statistics may mislead Mason records five different series of cases, aggregating 242 cases, with five deaths, or a mortality of about two per cent. The treatment consisted not in the Brand method, but in sponging and affusions, the use of antipyretic drugs, antiseptics, and tonics.

The following table contains a large number of cases treated without baths:

	Cases.	Per cent. of Mortality.	Treatment.
Basel (Liebermeister).	223	11.7	Calomel.
Basel (Liebermeister).	239	14.6	Iodine.
Maidstone, England...	1,885	7.5	General.
Boston (Mason)	676	10.4	General.
Homerton (Collie).....	677	9.5	General.
Glasgow (Collie)	618	8.2	General.
Société Médicale des Hôpitaux (1879)*	1,979	12.47	.....
Jaccoud	665	10.8	General.
Riess	900	7.5	Tepid baths.
Boston (Shattuck).....	237	9.8	Expectantly and cold sponging.
Germany (?) Brand has collected	19,017	7.8	All kinds of cold baths.
	27,116	10.02	

*These statistics are based upon the fact that twenty-one chiefs of hospital service reported to the Société Médicale des Hôpitaux (1890) 916 cases with 114 deaths, or 12.44 per cent., under general treatment; and for 1888 and 1889 this report also mentions 1063 cases so treated with 133 deaths, or 12.51 per cent.

In other words, 27,116 cases in Switzerland, America, England, Germany and France show that good nursing and careful non-meddlesome treatment will give a mortality of about ten per cent. It may be argued that these cases cannot be compared with cold bath methods, but the wide distribution of the cases and the large number of clinicians certainly give us what may be called a standard average. The reduction in mortality to ten per cent. is therefore due to good nursing and treatment, and the further reduction to 7.5 per cent. claimed by Brand advocates only amounts to about 2.5 per cent.

Admitting, then, that a harmless form of treatment with careful nursing naturally modifies typhoid fever, these factors must be deducted from the credit given to the cold bath of Brand (which gives 7.5 per cent.) before we can reach real facts as to the value of this plan *per se*, for in it careful nursing is a *sine qua non* to its use and only such medication is resorted to as is needed to control symptoms or accidents. Again, one other factor is not to be ignored, namely, that it is

an almost universal practise to use alcohol in the cold bath treatment, and this stimulation, often repeated many times a day, by means of a drug which lends force to the system, is to be credited with some effect. To emphasize still more the fact that good nursing and treatment modify the mortality without the bath, we can quote the figures of Collie comparing the death-rate in Basel with that elsewhere in the same years with and without the bath.

At Basel in 1873, under the cold bath, there were 163 cases with a mortality of 10.4 per cent.; during the same year at Glasgow without baths 275 cases with a mortality of 9.4 per cent.; and 305 at Homerton with a mortality of 9.5 per cent. In 1874 at Basel the water cases were 200 with a mortality of 10.5 per cent.; at Homerton 372 with a mortality of 9.6 per cent.; at Glasgow 343 with a mortality of seven per cent. As Collie well points out, it is likely that the cases in Glasgow with 500,000 population and East London with 1,000,000 would be more severe than in Basel, a county town of 40,000 to 50,000 people.

TABLE SHOWING MORTALITY UNDER GENERAL TREATMENT TO BE LESS THAN UNDER BATH TREATMENT.

	Number of Cases.	Treatment.	Mortality Per cent.
Basel (1873)	163	Bath.	10.4
Glasgow (1873)	275	General.	9.4
Homerton (1873)	305	General.	9.5
Basel (1874)	200	Bath.	10.5
Glasgow (1874)	343	General.	7
Homerton (1874)	372	General.	9.6

Before determining the value of a method of treatment from statistics derived from hospital practise it is necessary to ascertain the death-rate outside of that hospital and if possible for the entire city or surrounding country.

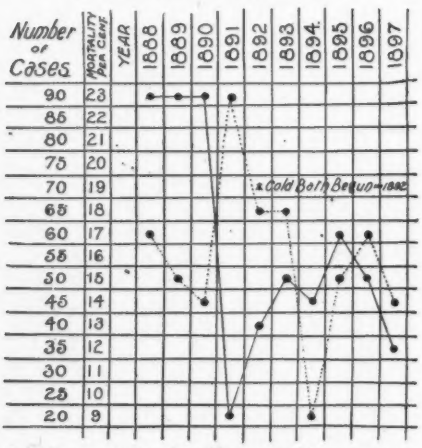
In this connection it is interesting to note that in Dr. J. C. Wilson's cases, recorded with great detail to the number of 108 as occurring in the German hospital from June 1, 1893, to October 1, 1894, and submitted to the most rigid type of bath treatment, the mortality reached 11.1 per cent., and that for the same two years 1893–94 the mortality in the whole city of Philadelphia, including every type of case and every plan of treatment, or none at all, was only 16.8; or in other words, the mortality of the bath treatment was only 5.7 per cent. less than that of the whole town. Again, in the series of cases which he has had since that time (October 1, 1894, to January 1, 1896), namely 117, he had nineteen deaths or a mortality of 16.25 per cent., whereas for the whole city of Philadelphia the mortality was only about 15.3 per cent. Allowing for the fact that Dr. Wilson excluded from his cases patients who were admitted moribund, and that all of them were under the most approved and complete nursing and in the hands of competent resident physicians and a physician-in-chief of wide experience, it does not seem to us that the bath treatment has really given in this instance a very great degree of life-saving; and it must be recalled that while the percentage of deaths named by Dr. Wilson was a percentage derived from all (with the exceptions noted) cases in the wards, the percentage of mortality for the city was really far less than it would seem, for many physicians neglect to report cases unless they grow so ill that it is done at once before the death certificate has to be signed.

Considering the fact that patients are supposed to be greatly benefited by this treatment, if treated before the fifth day, it is a curious fact that out of fourteen of Dr. Wilson's cases (in 108) which received the bath by the fifth day no less than four died, and another case died which is stated as admitted early in the disease. It is also an interesting fact that while the general mortality of Philadelphia was decreasing progressively in 1890, 1891, 1892, 1893 and 1894 from 20.3 to 15.7 per cent., that Dr. Wilson's statistics should have an increasing mortality from 1.8 in 1890 to 11.1 per cent. in 1894, and 16.25 in 1894 to 1896. Owing to imperfect health reports we cannot discover the percentage of typhoid mortality in Baltimore to compare with Osler's cases.

The same difficulty exists in New York in regard to Gilman Thompson's and the city statistics. At the Philadelphia Hospital for the ten years from 1888 to 1897 inclusive the number of cases of typhoid fever and the mortality per cent. is shown in the following chart (No. 5). The practise of tubbing was not instituted till 1892. How rigidly it has been enforced we have not been able to determine, but it is evident that the mortality has not been materially influenced by this means. Thus 1888, 1889, and 1890 had a mortality without the bath identical with that after the bath was used in 1895, 1896 and 1897; and 1888, 1889 and 1890 had a mortality lower than 1892 and 1893 when the bath was used. We think therefore that it may be considered proved that a large credit should be given to other causes than the Brand bath, and this holds true not only for this country but

abroad, for most of Brand's statistics are derived from German military hospitals in times of peace, when everything tends to a mild course of the disease. The military sanitation, the close watch over each individual, the fact that a livelihood is not lost if the patient goes to bed early, all tend to render the disease mild and to cause cases to come under treatment early. Further, the patients are in the great majority of cases very young, just passing out of their teens. It is evident, therefore, that the cold bath in itself is not as useful as would appear at first sight.

CHART NO. 5.—SHOWING MORBIDITY AND MORTALITY PER CENT. AT THE PHILADELPHIA HOSPITAL FOR TEN YEARS, 1888 TO 1897 INCLUSIVE.



Solid line, morbidity; dotted line, mortality per cent.

There are certain objections to the cold bath in the sense of tubbing which must be met. The first of these is that by its use an unnecessary expenditure of the patient's strength ensues. No one can see for the first time a typhoid fever patient bathed without a feeling of mingled pity for the case and mistrust for the method. To use Osler's clever words: "When I hear a poor fellow (who has been dumped, like Falstaff, 'hissing hot' into a cool tub) chattering out maledictions upon nurses and doctors, I am inclined to resent it, and to pray for a method which may be, while equally life-saving, to put it mildly, less disagreeable." So much for sentiment and perhaps judgment. Let us see if there are other rational objections.

To remove a patient too feeble to raise his hand to his head into a tub of water some 35° F. colder than his body, which is accustomed to the heat of his bed, seems heroic, and the lifting and necessary handling must produce some loss of needed strength. Again, the shock of sudden and complete immersion may or may not be harmful according to opinion, but the nervous awakening if really a good thing can hardly be looked upon without the thought that the nervous energy expended is unnecessarily great, and one wonders whether the same results for good could not be obtained by gentler measures. That they cannot remains to be proved. When it comes to permitting a patient to rise from his bed and step into the tub, then we believe the enthusiasm of the bath advocate oversteps the limits of good sense. Nothing can possibly be gained by this expenditure of strength and its strain on a heart taxed by fever, exhaustion, and toxemia. Even if strong enough at the time the patient should save such energy for some future crisis or to aid in his convalescence. If walking typhoid has a high mortality it is due to this lack of conservation of energy. It seems to us as unwise for a patient to arise and step into a tub with a possibly ulcerated artery in a Peyer's patch as for a case of aneurism to make any effort. The shock and altered circulation is sufficient strain on the blood-vessel without the additional strain of change of posture and of effort.

Thus Liebermeister says, although an ardent bath advocate: "It is possible that the determination of blood to the internal organs, caused by the abstraction of heat, may increase the *tendency to hemorrhage; and at all events, the moving of the body, be it active or passive, connected with the taking of a bath, is injurious.* The same thing, of course, holds true, to a still greater degree, in perforation of the bowels."

Hemorrhages.—The frequency with which hemorrhages occur varies greatly in different epidemics independent of any specific line of treatment over and above rest in bed. Lack of such rest certainly predisposes the patient to this accident. In 861 cases of this disease without the cold bath in Liebermeister's clinic at Basel, hemorrhages occurred seventy-two times, or in 8.4 per cent. Griesinger met with thirty-two cases in 600, or in 5.3 per cent.; and Louis found them in 5.9 per cent., excluding mild cases. The younger Wunderlich has recorded ninety-eight cases of typhoid fever without the bath with hemorrhage in two cases, or about two per cent. We find therefore that in 1559 cases treated without the cold bath there were ninety-nine hemorrhagic cases, or 5.2 per cent.

On the other hand we find that in bathed

patients Wunderlich, Jr., records 155 cases with sixteen hemorrhagic patients, or 10.3 per cent.; Immermann at Basel records 146 cases with six hemorrhages, or 4.1 per cent.; and Liebermeister 882 cases with fifty-five hemorrhages — 1183 cases, or 6.8 per cent.

This is shown best by the following table:

WITHOUT BATH.

	Cases.	Hemorrhages.	Per cent.
Liebermeister	861	72	8.4
Griesinger	600	32	5.3
Wunderlich, Jr	98	2	2
Totals	1559	106	5.2

WITH BATH.

	Cases.	Hemorrhages.	Per cent.
Liebermeister	882	55	6.2
Immermann	146	6	4.1
Wunderlich, Jr	155	16	10.3
Totals	1183	77	6.8

To these may be added: In America, with baths, Wilson's 140 cases with ten hemorrhages, or seven per cent.; Osler's 356 cases with twelve hemorrhages, or 3.4 per cent.*

It is interesting to note in this connection that Fitz places the general frequency at five per cent. and Loomis at five per cent. It is, however, only fair to state that Goltdammer from nearly 20,000 cases concludes that the bath does not increase hemorrhages. Brand claims they are less frequent, as do also Tripier and Bouveret; but Roland G. Curtin tells us that upon investigation he found that since the cold water treatment has been instituted the number of hemorrhagic cases has considerably increased, according to the hospital records that furnish the data, and in addition the mortality of the hemorrhagic cases is largely increased, viz., from five in seventeen, less than one-half, to twenty-five in forty-three cases, or over one-half; and further, on inquiry he found that in two of his tabulated cases the hemorrhage seemingly took place while the patient was in a bath, and in one case immediately after a bath.

An important point in this connection is the question as to the real danger from hemorrhage to the patient. In this opinions greatly differ. Thus Fitz tells us that it is always a serious symptom, but rarely fatal in private life; but that it may be very disastrous is shown by the fact that Liebermeister mentions forty-nine deaths due to this cause out of 127 deaths, Murchison fifty-three deaths from hemorrhage out of 100 deaths, and Homolle forty-four per cent. in 498 deaths. Osler asserts that death occurs in from thirty-five to fifty per cent. of hemorrhagic cases. Out of Griesinger's thirty-two cases of hemorrhage ten died, seven of these within four days of the hemorrhage. Liebermeister tells us that among his own cases 38.6 per cent. died when they had hemorrhage as against eleven per cent. without this accident; and Tyson tells us that the seven per cent. mortality in his cases under the bath treatment was due entirely to hemorrhage or perforation. It is evident that Osler's percentage is about correct.

Relapses.—It is admitted by advocates of Brand's method that relapses are more common under its use than without it. Osler met with fourteen cases of relapse in 160 cases bathed, or 8.7 per cent., but mentions five other cases of doubtful relapse, which raises the percentage; while Shattuck met with 21 in 129 cases, or 16 per cent., and eleven occurred before primary fever ceased. Wilson tells us that it occurred in 11.3 per cent. of his cases, and Osler tells us 8.7 per cent.; Shattuck 16 per cent., Immermann 15 to 18 per cent., Baumler 11 per cent., and Jaccoud 9 per cent., varying from 1 to 15 per cent. As against this we may place the frequency as given under no bath treatment. Thus Murchison gives it at 3 per cent., Gerhardt in 4000 cases 6.3 per cent.; Griesinger puts it at 6 per cent., and Strümpel at 4 to 16 per cent.*

At the Presbyterian Hospital in New York Gilman Thompson found the relapses in 193 cases to be 13.5 per cent., which is 2 per cent. higher than in 284 cases treated by all methods during the same time.

Liebermeister says: "In Basel, before the introduction of this treatment, 861 typhoid fever patients gave us sixty-four relapses, or 7.4 per cent., two of which were fatal; after the introduction of this treatment, 882 typhoid fever patients gave eighty-six relapses, or 9.8 per cent., ten of which proved fatal. *It appears, therefore, that the proportion of relapses and the number of deaths are both actually increased under the use of cold water.*" And discussing the probable bearing of these results he adds: "At present the probability

*Only 299 were bathed.

* It is not possible for us to discover if all the cases of Gerhardt and Griesinger were treated without the bath.

certainly seems to be in favor of the affirmative of the question, the more so as it appears that the frequency of relapses is greater in proportion as the antipyretic treatment has been the more systematically employed." Biermer has also found relapses more frequent since the introduction of cold baths.

On the other hand Murchison with his extraordinary opportunities places the percentage at three per cent.*

Having determined the fact that relapses are more common under the cold bath, we must determine what are the dangers of a relapse. As a rule we believe relapses are milder than the primary attack, provided the primary attack has been severe.† On the other hand, if it has been rudimentary or in the class called by some writers "typhus levissimus," then the relapse is more severe. In any event the relapses are characterized by a greater suddenness of onset and usually a shorter course. That the relapse is an element of danger seems self-evident, since it comes on in a patient already exhausted by disease. Therefore the prognosis is grave according to the severity of the relapse and the state of the patient. It is interesting to note that in Liebermeister's cases out of 111 cases of simple relapse the fever was longer in duration than in the first attack in thirty-seven, shorter in sixty-eight, and of the same length in two. In twenty-nine of the cases the primary attack was mild and in eighty-two severe, but the relapses were mild in forty-seven and severe in sixty-four, and seven of these died in the relapse.

Other figures might be stated, but these seem sufficient to prove that relapses are dangerous to the patient and to be avoided if possible. This is still further emphasized by the fact that at Basel out of 115 relapses hemorrhage from the bowel occurred four times, perforation twice, thrombosis once, pulmonary consolidation nine times, nose-bleed seven times, bed-sores four times, abscesses five times, and petechiæ three times.

To quote Liebermeister again: "If we take the reports of the years 1869, 1870, and 1872, at Basel, we find, among 467 typhoid fever patients systematically treated with cold baths, thirty-three deaths and fifty-five relapses, six of which were fatal; the frequency of relapses, therefore, counting only those patients who had survived the first attack, was in the proportion of 12.5 per cent., as against nine per cent. before baths were used. The higher rate of mortality among the relapses is of so much the greater import, in view of the fact that the relapses, too, were treated antipyretically, which ought rather to have given us a lower death-rate."

Perforation.—An interesting question is the effect of baths on intestinal perforation. What the ordinary percentage of this accident is is in some doubt, but according to Murchison it is in the neighborhood of three per cent., and this is about the percentage reached by Osler in cases bathed and not bathed.

The most interesting comparative statement as to the frequency of perforations with and without the bath is that made by Mason. Thus at Boston City Hospital the percentage of perforations in males was 1.4 and in females 1.3, while under the cold bath in Brisbane it was 3.6 per cent. in males and 1.6 per cent. in females—Liebermeister's statistics, viz., that there were twelve cases of this accident in 973 patients before the bath and fourteen in 1108 after it was introduced, show a very slight difference.

The mortality of this accident is very high. Of 1721 autopsies the percentage was 11.3, according to Murchison. According to Osler it was found in 2000 Munich cases 114 times (5.7 per cent.), and in twenty out of eighty of his deaths.

Duration of Disease.—The influence of the bath treatment on the duration of the disease seems to be to prolong it. It is necessary to determine the ordinary duration with and without baths. Very important classifications of cases are those made by Liebermeister and Jurgensen. The first of these clinicians speaks of the mildest cases as those in which the rectal temperature never or rarely rises above 103°, and the duration of fever does not exceed eight days. Such cases require only dietetic treatment and cannot be used to show the value of different modes of treatment. The mild cases do not have a rectal temperature above 104.8°, and the fever lasts sixteen days. The severe cases are those in which the rectal temperature rises above 105° and the fever ceases by the twenty-first day. Jurgensen considers all cases mild which have no fever after the tenth day, and those severe that have fever after this date.

Murchison states the mean duration in seventy-five cases to be a fraction more than

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*It is interesting to note in this connection that in Wilson's cases out of twenty-five cases in which the bath was commenced within the first week there were no less than four relapses.

†Flint is the only author of note who thinks that the relapses are more severe than the first attack.

twenty-four days. Flint states from going to bed to normal temperature sixteen days, with a maximum of twenty-eight days and a minimum of five days. Longest case seen by Flint was fifty-eight days.

Of forty-five of Flint's fatal cases the duration was a fraction more than fourteen days. Murchison tells us that the mean stay in hospital of 500 cases which recovered was 31.24 days, of 100 fatal cases 16.52, while the average duration of illness before admission of the 600 cases was 10.78 days. Again, Murchison tells that the pyrexia as a rule lasts at least three weeks, and the ordinary duration of enteric fever is from three to four weeks. Of 200 cases which recovered, and in which he was able to fix the commencement with tolerable certainty, the duration was: ten to fourteen days in seven cases; fifteen to twenty-one days in forty-nine cases; twenty-two to twenty-eight days in 111 cases; twenty-nine to thirty-five days in thirty-three cases.

The mean duration of the 200 cases was 24.3 days, and the mean duration of 112 other cases, which were fatal, was 27.67 days.

The average duration of residence in St. Thomas' Hospital, London, in 1894, 1895 and 1896 was from 43.1 to 51.8 days, and the average duration of fever from 14.3 to 16.73 days, although a great proportion of the patients were admitted in the first or second week.

If we take the twenty-five cases admitted in the first week of the disease given in Wilson's table, we find that the average stay of these patients in the house was forty-one days (40⅘), and the average day of normal temperature the nineteenth. The average maximum temperature was 104.6° (40.3). If the entire 108 given in his last table in his article are studied we find that the average duration of the fever was in the cases admitted in the second week 23.2 days, in the third week 27.3 days, and the average stay in the house of the second week cases 40.8 and of the third week cases 38.8 days. These figures would seem to contradict Wilson's statement that his patients as a rule return to their homes in two weeks from defervescence.

Gilman Thompson states emphatically that the cold bath does not ordinarily shorten the duration of the disease.

To summarize the points so far covered, we find that the mortality for typhoid fever to-day all over the world, except in the presence of individual epidemics of malignant infection, is not over fifteen per cent., and if the cases receive good nursing and non-meddlesome treatment, about ten per cent. or less.

That in American hospitals under the best men in the profession the mortality of typhoid fever is about 7.5 to 8 per cent., and sometimes ten or even eighteen per cent.; therefore the saving of life by the bath is not the difference between twenty-five per cent. and seven per cent., but between ten per cent. and seven per cent. at the very best.

That this method does not shorten the attack but probably prolongs it.

That relapses are much more frequent under it.

That hemorrhages are more frequent, when in reality the modification of all the symptoms by the bath would lead us to expect a decrease in their number.

That the frequency of perforation is not decreased.

If the general mortality of fifteen per cent., as we have shown exists, is reduced to ten per cent. by good nursing and treatment, and the mortality under the bath amounts to about 7.5 per cent. at the very best, as it does in the hands of all American observers, it is evident that the cold bath is responsible for a saving at the most of but 2.5 per cent.; and it is also evident that this 2.5 per cent. is saved by the favorable effect of the bath on the nervous system, circulation, respiration, and the toxemia, for the other cases of death remain unaltered in frequency or are increased.

With the manner in which these good effects are produced we shall deal a little further on. It yet remains for us to determine what are the defects of this method, then to consider how it does good, and finally whether any better plan or modification can be adduced.

In the first place it would seem an opportune time to protest against the almost universal application of the bath to this disease. It is, or ought to be, a fundamental law of therapeutics that there is no such thing as treatment by hard and fast rules of routine. The recommendation that all cases of typhoid fever with a temperature of 102° to 102.5° F. shall be placed in a tub of water at 65° to 70° F. is an affront to this rational law. Until all human beings are exactly alike in every attribute and characteristic and all micro-organisms are possessed of equal virulency, power of multiplication, and growth, every case of infectious disease seen by the physician will require careful study if the best re-

sults are to be obtained. He must modify his treatment to fit his case. It may be that some general trend of method is suited to all cases just as a coat is needed by all inhabitants of cold countries, but each individual needs a modification of the coat to fit his figure and necessities. Digitalis is useful in twenty-drop doses in many cases of valvular heart disease, it is useful in other cases in smaller doses, and in some not at all useful; and even a specific remedy, like quinine for malaria and mercury for syphilis, is subject to grave modifications in every case we meet if the best results are to be obtained.

It must be evident that as the temperature is far more easily reduced in one patient than in another, the temperature of the bath should be modified to the case as well as the duration of the bath. Every one knows how in one patient with a temperature of 104° the temperature is easily lowered, while in another, because of the severity of the disease, an excess of fat, or other causes, the reduction can only be caused by great effort.

When we consider all the points in the cold bath treatment it is almost impossible to avoid the thought that it is a measure to which in a few years we will look back with the same distress that we regard excessive venesection and other excesses. We are now told to plunge practically every case of typhoid fever into a bath at 70°; to keep the man, shivering, chattering and blue, in the water for some twenty minutes, then to lift him out on a bed, place a hot bottle to his feet, and perhaps elsewhere, and give him a drink of whiskey to overcome his feebleness and chills. Truly he is cast from the heights of pyrexia to the degradation of collapse, and then with a swift turn stimulated to renewed febrile efforts. That the mortality is decreased by this method may be partly true, but to use a simile, are we not using croton oil to move the bowels in all cases when cascara will do equally well in a number, and the croton oil is required only in a few?

These facts have been recognized by so many eminent men of very large experience that it would seem unnecessary to quote them were it not that followers of the cold bath plan have recommended its use in every case of the disease which comes to their hands. Thus we find one of the leaders in his enthusiasm for this method of treating this disease telling his readers that he has used it continuously for seven years, that it has been the "only treatment" in his wards, and that all patients suffering from this disease have been submitted to it except very rare cases in which the axillary temperature has not reached 101.5°, those brought in in a dying state, and those admitted after the third week. He also stops the bath in the presence of hemorrhage and perforation. And again we are told that the patient receives a full bath at 65° to 70° every five hours when the rectal temperature reaches 102.2° or over. Other clinicians do likewise. On the other hand we find no less an authority than Strümpel making the following statements:

"In so far as the height of the fever furnishes an indication for baths, we may accept, say, 103.6° F. (39.8° C) in the rectum as the temperature calling for a bath. At night we have given baths very seldom, except when forced to by extremely high temperatures or other bad symptoms. It must be a mistake to wake a patient who is quietly sleeping, and put him into cold water, even if his temperature is above 104° F. (40°C.). Likewise, in cases where the temperature shows considerable spontaneous remissions, there may be no use in inflicting a cold bath upon a patient who has high fever only temporarily.

"It is not always advisable to use baths, however advantageous this treatment may be, in typhoid fever. There are a number of contraindications which cannot be disregarded, as great weakness or great sensitiveness, such that the excitement caused by the bath might do harm. Sometimes baths are followed by severe rheumatic ('rheumatoid') pains in the limbs, and often they seem to promote the occurrence of furunculosis. In such cases it is often necessary to omit the baths, or at any rate to employ them less often and at a warmer temperature. The same is true if a severe laryngeal affection develops, or otitis or nephritis. Nothing seems to us a greater mistake than to attempt to establish a scheme for the treatment of typhoid fever by baths that shall be always applicable. Here, if anywhere, the only correct way is to treat each individual case according to its special symptoms and circumstances."

Brand himself modifies the bath and states that he always uses warmer baths for twenty-four hours if the patient has been ill as long as four days, and his enthusiastic follower Baruch tells us that like all agents that are powerful for good this method may produce irreparable damage (Baruch, p. 42). The depressing effect of the bath has been noticed by Liebermeister, who considers a high degree of cardiac weakness an impor-

tant contraindication. He also points out that some patients cannot bear a sufficient repetition of them, and that other contraindications may exist to their use.

Osler also tells us that the baths have often been changed to cold sponges on account of profound weakness, tenderness and swelling of abdomen, signs of perforation, and because of the active protestation of the patient. Out of 356 cases only 299 were bathed, showing that in Osler's view a fairly large proportion of cases are not suited to the bath.

Finally, the patient must be strong enough to react and rally from the bath. As we shall show, all the good effects come from reaction, and Baruch points out that the bath which is of benefit in the first week may in the third prove a fatal depressant (p. 62), and a very feeble patient in the first or second week is quite apt to fail to react.

Loomis has well said: "There is no remedial agent which requires greater care and judgment in its use than the cold bath, yet doubtless, when judiciously employed, the lives of many typhoid patients may be saved, and it is equally certain that when injudiciously employed many lives may be destroyed. The general condition of the patient and the stage of the fever must be considered; also the effects of the first few baths must be carefully noted. Should a patient's temperature range at 104° or 105° F., it is no positive indication for the resort to a cold bath, or that a cold bath is the best agent to be employed for its reduction. If the patient after the second or third bath is more quiet, has less delirium (if delirium previously existed), if his breathing becomes easy and natural, if the heart's action is more regular and forcible, and he falls asleep and perspires, there can be no question in regard to the beneficial effects of the bath. If, on the other hand, the bath is followed by feebler heart's action, by dusky cheeks, by rapid respiration, and by coldness of the extremities, from which condition the patient rallies slowly and imperfectly, it is certain that, however high the temperature may range, harm will be done by continuing the baths. When the extremities are cold, or there is profuse hemorrhage from the bowels, or when from any cause there is great feebleness of the heart's action, and especially in the case of aged persons, cold baths are contraindicated."

A large number of other authorities might be named, but we may quote Nothnagel, who asserts that when there is cardiac feebleness along with fever, and especially when profuse diarrhea is present, cold baths should not be used.

These quotations and the reasons given show that it is unwise and unnecessary to bathe in a tub every case of typhoid fever. This treatment has its limitations just as all others have theirs.

It is said by the bath advocates that if mild cases are not bathed they may become grave afterwards, but if this is a valid excuse then we should bathe patients with a practically normal temperature or one below that in which the bath is recommended. Personally we cannot believe in this view. On the other hand, we believe that in cases with little fever the good nursing, massage, proper feeding, sponging and care will be adequate.

We come then to a consideration of the questions, How is the good accomplished? and second, Cannot some modification of the present plan be adopted capable of attaining the same ends without the suffering of the patient and the immense labor involved, and without some of the very serious drawbacks now found associated with it?

It seems to be universally conceded that in moderately severe cases of typhoid fever the reduction of the temperature is a comparatively unimportant effect of the bath, and in the cases of marked and severe febrile movement it is of great advantage over and above the apyretic influence. In other words, it is confessed that the cold bath in typhoid fever possesses an influence of great importance upon the general system far in excess of its antipyretic effects.

It is true that Liebermeister many years ago expressed a belief that the cold bath did good solely by lowering temperature, but at that time the effects of the bath on leucocytosis, oxidation and the true influence of massage were not known, and his belief that the nervous symptoms are chiefly the result of the fever is no longer tenable and is strongly combated by Strümpel and others. To use the words of Dr. Simon Baruch, the idea that high temperature is the chief determining cause of fatality in typhoid fever must be abandoned (Baruch, p. 110).* Further than this, the cold bath does not materially modify the whole body temperature, for as Baruch (p. 59) states in italics, "the fact is that the colder the bath the less intense its power of reducing internal temperature."

*Baruch also says whoever expects to throttle the fever by the bath will be disappointed.

He has often seen the mouth temperature after a bath of 65° in typhoid fever reduced to normal while the rectal temperature was two degrees above normal. This is also stated by Liebermeister (Handbuch der Path. und Therapie des Fiebers, p. 102).

To any one who has studied the general subject of hydrotherapy it is evident that the cold bath exercises the same effect upon the blood-vessels that constant exercise of function always produces, namely, an increase in normal tone and ability to perform normal work. The blood-vessels are in one respect like rubber tubes, namely, they remain elastic as long as they are frequently exercised and become brittle as soon as they lie idle. The cold bath therefore inproves vascular tone, and the result of this is a decreased tendency to stasis of blood and lymph in the tissues. Further than this, the peripheral blood-vessels being first contracted by cold are emptied as the central ones are filled, and then as the reaction takes place the flow is reversed, as it were, and the peripheral vessels are flushed by an excess of blood which cools the body by bringing hot blood to the surface and brings to the emunctory portions of the skin effete material for elimination. Finally, when the first shock and rebound of a bath is past the circulation settles back to a normal equilibrium, with the result that anemic areas have been supplied with blood, congested areas relieved, toxic matter removed from contact with vital cells and carried to the eliminative organs; with the improved circulatory state these are active in their eliminative function. Further than this, by this means perfect oxidation of tissue takes place and probably oxidation of the toxins of the disease ensue. Liebermeister, Röhrig and Zuntz have shown that the use of cold externally increases oxidation in the body so that a large amount of oxygen is taken up and more CO_2 is eliminated.

So far then we have a lowered temperature, an improved circulation, an elimination of toxic matters, and an improved nervous tone by removal of the fever and the poison. There is still another function performed by the cold bath, namely, an increased leucocytosis, as shown by the studies of Winternitz. This investigator has shown that the bath, and indeed all cold applications to the entire surface, greatly increases the number of leucocytes and the percentage of hemoglobin; and Thayer of Baltimore has confirmed these observations, finding in typhoid fever in particular that the number of leucocytes is increased from two to nearly fourfold by this means. It would seem probable from Thayer's studies that this increase is an actual one and not solely due to a dispersing of the leucocytes from certain areas out into the general circulation. So, too, Jacquet of Basel found that the red blood cells in the general circulation may be raised about 500,000 in febrile cases by the cold bath. Thermes has reached like results.

Again, no bath in typhoid is properly given if active rubbing of the body is not resorted to while the patient is in the bath. This massage aids the effect of the cold shock most efficiently, possesses all the benefits of ordinary massage, and also greatly increases leucocytosis or leucocytic activity.

There is not space for any details in further support of these assertions; those familiar with the minute and general effect of massage know them well. J. K. Mitchell has shown that massage increases the number of the red cells and adds to their hemoglobin value both in health and in anemia.

Having indicated some of the chief methods by which the cold bath does good, we come to the second proposition, namely, Cannot some equally effective method be carried out, less harassing and exhausting to the patient and devoid of the manifest disadvantages of the bath? We admit that it is not possible for us to present an array of statistics in support of the following suggestions, because it takes a long period of time to collect an array equal to those of the cold bath and a hospital service unusually rich in typhoid cases. One of us (Dr. Hare) has used cold sponging in a more or less active form for the past ten years in his hospital wards whenever it was needed, and has rarely if ever used the bath. His results in St. Agnes and the Jefferson Hospitals suggest that the following rules be laid down for the treatment of typhoid fever cases:

1. When admitted early in the disease, with constipation or moderate diarrhea, the physician should give a full dose of calomel in divided doses in order to stimulate the liver and antisepticize the bowel with bile.

2. Control the fever when it reaches 102° F. by sponging. The patient being stripped and laid on a rubber sheet or blanket over such a sheet, he is to be sponged with water adapted in its temperature to his needs, and it is to be remembered the rapid application of a low temperature is more refreshing than the prolonged application of a higher temperature (Baruch). The chief advantage of

cold sponge lies in the shock and reaction. This is better obtained by the use of ice sponging than by the bath. The patient's surface is always bright red in ice sponging, often blue in the bath, and that the fever is not the chief danger in the case renders the fact that as great a reduction from the sponge is not reached as from the bath of little importance except in hyperpyrexia.

Shattuck tells us that he has found no marked or constant difference in the antipyretic value of cold sponging at 60° for 20 minutes, the cold pack at 60° for 20 minutes, or the cold bath at 70° for 10 to 15 minutes.

Finally, if this does not bring the temperature down to 100.5° or 101° in twenty minutes resort should be had to the tub.

It is essential when the sponging is used that more of it be applied to the back than the front of the body, for at the back the great muscles and thick skin retain the heat as a reservoir, which is not cooled if only the front of the body is sponged. Further, the posterior surfaces are the ones apt to be congested and sore from the dorsal decubitus and therefore need the stimulant effect of the bath, as do the kidneys and other deeply situated organs. That this treatment is of value is shown by the marked redness of the skin, the improvement of the circulation and respiration, and the cleared mind. That it increases leucocytosis is proved by the following studies made in my wards by Dr. Holder, my colaborer in this paper:*

3. It is advisable not only to use friction in a light form, but to use moderately active massage with the same objects in view as when the rest cure is undertaken, for the proper treatment of typhoid is a modified rest cure. We are firmly convinced that by this means bed-sores, local congestions and effusions, edematous swellings, peripheral nerve pains and muscular feebleness will be largely decreased, and Pospischl has shown that mechanical irritation of the skin is capable of increasing heat loss ninety-five per cent.

4. In nearly all cases give more nourishment than the average typhoid patient has usually had in the past. Attention has recently been forcibly called to this necessity by Shattuck and by one of us in the editorial pages of the THERAPEUTIC GAZETTE. With the exception of broths (which are culture media for the bacillus of typhoid) and meats, almost any article easy of digestion should be allowed, as one or two or more lightly boiled eggs, corn-starch, arrowroot, etc.

5. Use stimulants in carefully graduated doses whenever the circulation needs them, particularly alcohol. Even the cold bath enthusiasts give whiskey to overcome the depression they often produce. Beyond these directions each case should be treated for the symptoms which arise from time to time. Let the physician be a watchman constantly and a therapeutist or hydrotherapeutist only as necessity arises.

BLOOD COUNTS IN ENTERIC FEVER.†

Case	Hemoglobin.	Before sponging.		After sponging.		Hemoglobin.
		Red blood cells.	White blood cells.	Red blood cells.	White blood cells.	
No. 1.....	60 per cent.	4,800,000	7,000	5,200,000	14,600	70 per cent.
No. 2.....	62 per cent.	4,600,000	9,000	4,600,000	11,000	80 per cent.
No. 3.....	80 per cent.	5,200,000	11,000	5,400,000	63,000	87 per cent.
No. 4	65 per cent.	4,500,000	7,300	4,800 000	23,000	65 per cent.
No. 5	55 per cent.	4,200,000	6,000	4,700 000	6,000	58 per cent.

† Technique: Thoma-Zeiss apparatus with Toisson's solution. For red blood cells from 32 to 96 squares were counted. For white cells one platform with a "cut-off," making in all 1200 squares to each count. Hemoglobin estimated by von Fleischl's hemometer. This is from three (3) separate counts at various times.

A differential count with Ehrlich's triple stain showed slight changes, such as Thayer found, in the varieties of white cells. These changes are not constant nor are they great enough to be of much value.

* As an illustration of the fact that we have no statistics giving a fair report of the effect of the moderate and *proper* use of cold in fever aside from the cold bath, we may cite an instance named by a recent writer. A male of eighteen received baths during the second week of an attack of typhoid fever, and was so seriously depressed by them that a so-called "cold pack" was used. This "cold pack" consisted, we are told, in wrapping a patient in a cold wet sheet and then wrapping him in a blanket for an hour. If there be any fever present such a pack in a very few moments becomes not a means of materially reducing fever, but a hot Russian bath, and one of us knows of a case in this city in which a hyperpyretic patient was so treated and speedily died. The case quoted from another writer is cited by him as one which shows the comparative effects of cold bathing and cold packs, although the former were used in the second week and the latter in the third, and although the cold pack as described is not an antipyretic measure of any moment. This is not a comparison between cold bathing and cold sponging, yet one reading his text would get the impression that all other methods of reducing temperature than plunging in typhoid fever were inefficient.

Finally, let us state that the object of this paper is not that of the iconoclast, nor that of one desirious of urging upon the profession any definite routine plan of treatment. It is an endeavor to determine the exact value of a well tried plan, to point out the fact that a rigid routine is inadvisable, and to suggest that the cold bath itself is perhaps equivalent to using an engine when in some cases at least hand power will equally well spin out the thread of life.

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*INTRAVENOUS INJECTIONS: WITH THE REPORT OF FIVE CASES IN WHICH THE SALINE SOLUTION WAS SUCCESSFULLY USED IN COMBATING SHOCK AND HEMORRHAGE.**

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Having been asked by the President of this Society to read a paper, I have selected a subject which is at present receiving the attention of the medical profession. Owing to the critical nature of the cases which call for intravenous injection of saline solution and the suddenness with which the call is liable to come, the general practitioner as well as the surgeon should familiarize himself with its usefulness and the technique of its administration.

The introduction of fluids into the vascular system of an individual is by no means a new procedure. It is an exceedingly old operation and was performed in ancient times. Ovid, in his Metamorphoses, speaks of blood being taken from young healthy men and mixed with vegetable juices, then injected into the veins of old men who longed to renew their youth.

In 1665 (Reference Handbook of the Medical Sciences, vol. vii, p. 214) Lower, of Oxford, performed the operation of transfusion with success. He bled animals to a condition of syncope and resuscitated them by injections of blood from other animals. Denis, of Paris, followed Lower in these experiments. He transfused a patient who had been bled and purged for fever. Ten ounces of lamb's blood was injected and the patient recovered. Subsequently he was called to an insane patient who had been bled and purged without changing the mental condition. He injected nine ounces of calf's blood, and recovery from the mental disturbance was the result. Three months later the mental trouble returned, and Denis attempted to operate again, but on opening the vein in the patient's arm found that no blood flowed. He did not finish the operation and his patient died. The wife charged the physician with killing her husband, and the latter retaliated by saying that she had administered poison to him. The case created considerable excitement in Paris, the operation fell into discredit, and a law was finally passed forbidding its performance.

In 1665 two German surgeons, named Kaufmann and Purmann, claimed to have cured a leper by the repeated injections of lamb's blood. During many years blood from animals was occasionally injected into the vascular system of the human patient to meet certain demands, but this maneuver was looked upon with disfavor, as many believed that the blood of calves and other animals contained particles of various kinds necessary for the development of such peculiar tissues as horns, etc., belonging to these animals, and that consequently these elements would prove deleterious when in the vascular system of the human patient.

There seems, according to the old writers, to have been considerable diversity of opinion as to what becomes of the blood-corpuscles when taken from an animal of a different kind. Marfels and Moleschott (quoted by Hamilton, Text-book of Pathology, vol. i, p. 474) recognized the blood-corpuscles of the sheep in the circulation of the dog months after they had been transfused. It is said that between animals closely related blood can be interchanged with impunity; for instance, the blood of the calf for that of the lamb, and horse's blood for that of the ass, but in case of man it has been found that it is safe to transfuse only from one individual to another.

At the present day there is scarcely any difference of opinion with regard to the use of blood from the lower animals; it is regarded as dangerous, and it is seldom or never employed. The transfusion of milk had at one time many advocates. Dr. Joseph W. Howe, of Brooklyn (Reference Handbook of the Medical Sciences, vol. viii, p. 221), in speaking of his experiments upon dogs with the intravenous injection of milk, says that when he had bled seven dogs to a state of syncope, milk was injected and not a single recovery took place. Two dogs were bled in a similar manner, no milk was injected,

*Read before the W. W. Keen Surgical Society, Jan. 8, 1898.

and recovery occurred in each case. The only conclusion that can be drawn from this is that the milk killed the dogs. Dr. Schafer, of New York (Jacobson's Surgery, 3d edition, p. 90), found that the injection of milk, after dogs had been reduced by bleeding to an almost lifeless condition, caused a temporary rise in the blood-pressure, but no permanent benefit. On post-mortem examination the blood-corpuscles were found to be disintegrated and the blood swarming with bacteria.

After it had become evident that the blood of animals would not functionate properly in man and that milk in the hands of many proved unsatisfactory, it became a universal practise to use human blood for transfusing purposes, and for years it was a question whether human blood should be introduced in its natural state, or be deprived of its fibrin before being introduced.

The old as well as the recent literature on the subject tells us that transfusion of pure blood is followed sometimes by capillary thrombosis. One great trouble with defibrinated blood is the uncertainty of its action; it is sometimes harmless, but at other times highly dangerous. It has been suggested that some saline solution having the power of delaying coagulation—*i.e.*, sodium phosphate—should be added to blood before it is introduced. Dr. W. Hunter (*British Medical Journal*, 1889, vol. ii, p. 305) condemns its use. He is of the opinion that the use of a three-fourths per cent. solution of sodium phosphate will cause red corpuscles to break up and disappear in twenty-four hours, and that the use of this salt with the blood will not prevent the occurrence of capillary thrombosis.

The great difficulty which is often experienced in obtaining human blood for transfusion, and its want of advantage over the ordinary saline solution in the majority of cases, to say nothing of its dangers, has led the operators of to-day to use the saline solution exclusively.

Before going into the question of the advantages of the normal saline solution over the previously recommended fluids for the intravenous injections, it will be well for us to look into the elements of the blood that are essential to life and how these elements are affected by introducing other substances into their midst. We know that vital activity of all kinds—respiratory, nervo-muscular, etc.—necessitates a constant and free supply of oxygen, and this want is filled by the circulating blood carrying the red corpuscles laden with the indispensable element. We have been taught that the hemoglobin is that part of the blood which absorbs and gives up the greatest part of the oxygen, and that it is to their hemoglobin that the red corpuscles owe their function of being oxygen carriers. When we study the circulation and the respiration we see that the healthy corpuscles absorb oxygen during inspiration, and while these corpuscles are passing through the capillaries they give up the oxygen, which combines with carbon to form carbon dioxide or carbonic acid; this in turn is carried by the corpuscles to the lungs, where it is exhaled. Any condition which arrests the activity of the corpuscles will cause death by allowing the accumulation of carbonic acid. From the above it is a just inference that the corpuscles must not only be capable of functionating properly, but must be in circulation at all times and under all circumstances. Besides corpuscles and their hemoglobin, which we consider to be a source of power, the human blood contains water, fibrin, albumen, fats, and salts. As fibrin exists in such small quantities in the blood, some distinguished physiologists think it is a product of the activity of the tissues, and in normal circumstances is destroyed as rapidly as it is formed, being burnt up by the oxygen and converted into excrementitious material (Chapman). There must be something in this view, as blood, when it has been whipped and deprived of its fibrin, seems to accomplish as much as pure blood, when injected into the vascular system of another animal. Albumen, salts and fats are supposed to furnish materials for the tissue for repair, and while they are really essential to life and comfort in the long run, we can conceive of no immediate condition in which the vital forces are dependent upon them.

The above statements show the fallacy of using milk for transfusing purposes in cases where there has been a sudden loss of blood. Next to water, common salt is the most important of the proximate principles of the blood. It not only gives to the blood its alkalinity, but enters freely into the process of osmosis, promotes absorption, and aids in preventing dissolution of the corpuscles. Since water forms three-fourths of the blood, it must necessarily play an important part in keeping up the volume of the blood.

After severe operations in which there has been considerable blood lost, there is always a great fall in the blood-pressure, and death sometimes ensues on account of failure of

circulation due to the rapid fall in the pressure. In health the blood-pressure is dependent mainly upon peripheral resistance, and this in turn depends upon the action of the vasomotor nerves.

Whatever may be the cause of lowering or raising the blood-pressure, it is certain that the pressure is lowered in cases of severe hemorrhage, and is raised when fluid is injected to replace the lost blood. Indeed, the blood-pressure is influenced by the intravenous injection of fluids in patients who are not suffering from shock or loss of blood, as I will show presently.

Dr. Woolridge, of London (*Lancet*, 1891, vol. ii, p. 626), shortly before his death, had been making experiments on transfusion in animals, by means of which he was able to show that after an animal had sustained a loss of blood sufficient to terminate its life, there was left in the blood vascular system enough corpuscles to sustain life, if sufficient fluid be added to keep them in circulation. So strong was Dr. Woolridge's belief in the value of saline solution that he used to tell the students in his lectures on physiology, "No person should die of hemorrhage."

Reconsidering, it seems evident that the elements necessary to sustain life in a person previously healthy who has lost considerable blood are healthy corpuscles, which must be suspended in a fluid the character of which is harmless to the corpuscles and the pressure of which must be sufficient to carry these corpuscles from the lungs through the capillaries and back to the lungs. Since the question has resolved itself into one of corpuscles and fluid, and experiments have shown that after a severe hemorrhage a sufficient number of corpuscles remain in the blood vascular system to maintain life if only enough fluid be introduced to keep them in circulation, the question which remains is, What fluid would prove to be the best? We are inclined to believe that the nutritive value of blood, whether pure or defibrinated, for transfusing purposes is very small, that its real value depends upon its physical properties, and these are in no manner greater than an equal quantity of any fluid which will raise the intravenous pressure and not interfere with the activity of the corpuscles. Quantity and not quality seems to be the chief cry of the corpuscles after severe hemorrhage. In view of this fact the question may arise in the minds of some why ordinary water would not suffice. In an emergency the intravenous injection of ordinary water has been followed by results as successful as any ever obtained after transfusion of blood (Coates, quoted by W. Hunter, *British Medical Journal*, vol. ii, p. 309). Now that it is known that ordinary water can be used for intravenous injection, we ask ourselves if this can in any way be modified. Next to water common salt is the most important of the proximate principles of the blood, absorption and osmosis being influenced by it. If it had no other action than that of assisting the corpuscles to absorb oxygen in a critical period, it would be justifiable to use it; but more than this, it is claimed that the existence of the corpuscles partly depends on the presence of sodium chloride, which absorbing any superfluous water prevents their dissolution. The experimental research on intravenous injection of various solutions (by MM. Bosc and Vedel, *Gazette des Hôpitaux*, 1896, p. 938) is interesting. The authors experimented with the following solutions: distilled water, ordinary water, simple saline (chloride of sodium) solutions, and the so-called artificial serum, sodium chloride and sulphate of sodium (equal parts of a strength of 7 in 1000). Their conclusions are as follows: Distilled water is noxious even in small doses and ought not to be injected alone in the veins. Ordinary water is, on the contrary, not toxic. Its destructive effects on the red corpuscles are less marked than those produced by distilled water, and in emergency it may be injected intravenously by itself. Simple sodium chloride solution is quite innocuous so long as the quantity of salt does not exceed three times the quantity of the sodium chloride contained normally in the blood. The physiological value of the artificial serum solution is not superior to that of the simple saline solution, and simple salt solution 7 per 1000 is the most convenient for intravenous injection.

Dr. William Hunter, in his admirable address on transfusion, delivered at the Royal College of Surgeons, London (*British Medical Journal*, vol. ii, 1889), said: "Any advantage that transfusion of red corpuscles may have over simple saline injections is counterbalanced by the dangers attending the simultaneous injection of the white corpuscles. In the case of defibrinated blood, the latter so preponderate that the transfusion of defibrinated blood is an operation not only dangerous in itself, but one whose practical value by no means serves to compensate for the additional risks run in carrying it out. Under no circumstances is transfusion of

milk or of other mixtures possessing what are supposed to be nutritive properties ever indicated. They possess no value not possessed by an equal bulk of saline solution." Dr. Hunter also said his experiments upon animals show that the recovery after intravenous injection of the saline solution is remarkably rapid. The time required for the return of the red corpuscles to their original number after loss of blood, without subsequent transfusion of blood, varies from two to three weeks. With subsequent injection of simple saline solution it is the same; whereas with subsequent transfusion of blood complete recovery is delayed a week or more. Further, what is perhaps more striking and certainly is of more importance, is the fact that during the subsequent recovery the animals generally appear to be in better health after intravenous injection of the saline solution than after transfusion of blood. The intravenous injection of the saline solution is, then, to be recommended above all other operations in cases where there is a fall of blood-pressure due to the excessive loss of blood. Its use is also indicated during severe operations as a preventive of traumatic anemia.

There have been many theories advanced in regard to the pathology of shock. Some are of the opinion that the great mass of blood, owing to vasomotor disturbances, stagnates in the abdominal vessels, but little of this fluid getting to the vital centers. Others adopt the theory of reflex paralysis of the vasomotor nerves, holding that at first there is contraction and subsequently general dilatation of the blood-vessels, and that the heart is unable to force the small amount of blood through the empty vessels. Its own muscles are insufficiently supplied with stimulus, and it gradually stops beating. If either of these theories be accepted, or if we pin our faith to the theory that shock is a sort of heart failure due to a temporary paresis of the muscles of the heart, the indications for treatment in each case are the same, and the whole problem rests upon the inability of the heart to force the blood through the blood-vessels and at the same time to furnish proper nutrition to its own substance. Experiments upon animals prove the importance of the fluid in the cavities and in the heart substance itself. If the heart of a frog be taken entirely out and emptied of blood, the beating will stop; but if a few drops of warm water or blood be introduced into the ventricle the contraction will recommence. Even fragments of the heart will contract and dilate if a few drops of warm water be applied. While the presence of fluid, whether blood or warm water, within the heart cavities will stimulate the muscular fibers and cause contractions, we know that contractions are influenced by the presence of blood in the heart substance itself.

With each ventricular systole blood is forced into the aorta and the blood that the coronary vessels receive is delivered by these vessels into the substance of the heart. The importance of blood flowing through the coronary system of vessels is evident when it is known that if the coronary arteries of an animal be ligated the heart will almost immediately stop beating. Since the coronary arteries arise from the aorta near its commencement and immediately above the semilunar valves, they must necessarily be the first vessels in the body to receive a portion of the heart's contents. Accordingly the heart muscles must be the first muscles in the body to receive nourishment, and nourishment means muscular force. In the first theory of shock the blood stagnates in the abdominal vessels, and naturally the heart muscles are forced to feebly contract, practically, on space. The blood, and particularly the carbonic acid in the venous blood which is known to stimulate the inner wall of the heart and cause contractions of the muscles to a certain degree, cannot reach the heart in sufficient amounts to do good. As the general circulation is depressed the coronary circulation, which is a source of power in itself, is bound to suffer in proportion. In the second theory the conditions are about the same. The last theory shows blood to be in the heart cavities, but the contractions are not of sufficient force to drive it out with the proper vigor.

Physiologists tell us that the flow of blood in the veins is essentially due to the contractile force of the heart. Experiments, as we have just seen, show us that vigorous contractions of the heart can be produced by introducing a warm solution into the ventricle. With a cannula in the median basilic vein, or if necessary in extreme cases in the external jugular, a warm saline solution can be forced into the right side of the heart. The presence of the solution will not only give the fluttering heart something to contract upon, but will stimulate the inner wall and cause contractions. A few vigorous contractions should be a factor in starting the great mass of blood that had settled in

the abdominal vessels. With the return of the venous blood to the right side of the heart will come the carbonic acid, which is known to be a powerful stimulus to the inner wall. With the return of the arterial blood, the coronary vessels will receive their share and give to the heart the nutritive materials out of which the muscular or contractile force of the heart is developed. No doubt in many cases of shock death occurs from the want of a few vigorous contractions of the heart muscles. Some may take the ground that the changes in the vascular system in shock are secondary to the action of the sympathetic nervous system. I am treating the effect rather than the cause.

If the condition in regard to the circulation in shock be due to a general depression of the nervous system, or if the weak action of the heart be due to a vasomotor paralysis, or if we accept the theory that overirritation causes fatigue of the nerve centers and this is manifested by reflex paralysis, our object in each case is the same, namely, to support the heart's action the best we can until the nervous system as a whole or a part recovers itself, and when this happens the individual filaments as well as the centers will receive Nature's stimulus, the blood.

It is well enough for some to treat shock with such drugs as are known to exert their chief influence on the nervous and vascular systems, such as strychnine, digitalis, etc., but it should be remembered that these drugs are only useful in cases where the vitality of the system is in such a condition that absorption can take place. If the blood circulates freely in the tissues, absorption is active; but if the circulation is depressed, absorption is slow.

In cases of severe hemorrhage, collapse or shock the subcutaneous tissues are deprived of blood to such an extent that absorption cannot take place. So the repeated doses of powerful drugs which have been introduced into the subcutaneous tissue from time to time during collapse, shock, or the exhaustion from hemorrhage, cannot be absorbed until the vital functions of the patient are restored; then these drugs, suddenly absorbed and acting together, may poison the patient.

In December, 1893, Dr. William Wells and I were called to see a young woman who had just given birth to a large child and was having a fearful post-partum hemorrhage. We induced uterine contractions by injecting hot water and packing, after which we directed our attention to her exhausted state, as she had lost so much blood that she was nearly dead. There was in the patient's room a bottle which contained a solution of strychnine; five minims of this solution contained one-twentieth of a grain of the alkaloid. A metal barrel hypodermic syringe, the capacity of which was thirty minims, was filled from this bottle and handed to me when I asked for one-twentieth of a grain of strychnine in solution. The contents of the syringe was injected into the patient's arm. This injection had no effect, and half an hour from the time it was given we were informed that the syringe instead of containing one-twentieth of a grain of strychnine dissolved in thirty minims of water, each five minims contained one-twentieth of a grain. It was evident that the patient had received at one injection three-tenths of a grain of strychnine without producing any perceptible changes in the respiratory, circulatory or nervous system. We attributed our good luck to the non-absorbing qualities of the tissues, and for fear of getting poisonous effects of the drug when reaction occurred, thirty grains of bromide potassium and fifteen grains of chloral were given by the mouth, and twenty minutes later a similar dose of the same drugs was given by the rectum. The patient recovered and was living and in good health one year after the confinement. The solution used in this case was prepared at the Jefferson Hospital drug dispensary, and I have every reason to believe it was fresh and capable of producing positive effects under favorable circumstances.

I mention this case to show that in cases of excessive hemorrhage the vitality of the patient is so reduced that drugs cannot be absorbed.

If absorption cannot take place when one is bleeding from his vessels, I cannot see how it will take place when one is bleeding into his vessels, as in case of severe shock. In both conditions the circulation is so interfered with that the tissues do not receive enough blood to even start absorption.

Drugs by the rectum, drugs by the mouth and drugs by the hypodermic method have no place in extreme shock. Paget says: "There is, perhaps, no case in the management of which the courage to do little is more needed than in shock. Great energy of treatment may do great mischief." Rest, external heat and the intravenous injection of a warm solution seem to meet the indications in extreme shock. When the signs of

reaction have well appeared, the use of saline solutions must be discontinued; then comes the time for the use of strychnine, digitalis, etc. The quantity of the saline solution to be injected varies according to the age, the amount of blood lost in cases of hemorrhage, and the reaction signs in cases of shock and collapse. In cases where there has been considerable blood lost the amount should be greater than in cases of collapse or shock. The quantity ranges from a few ounces up to three or four quarts. The chief guides in any case are the return of the pulse, with increase in volume and diminution in rate (for instance, a fall from 140 to 90 or 100), return of color, facial expression, and consciousness. The temperature of the solution should be kept at about 100° while injecting. A convenient way of handling the solution is as follows: Have three quarts of a cooled boiled solution containing twelve drachms of salt. When the time arrives to administer the saline solution, take a small quantity of the above solution and add to it an equal amount of boiling water; the solution will then be ready to inject. The fluid should be forced in gently and the pulse should be carefully watched for fear of overloading the vessels. Strict attention should be continuously given to the pulse and respiration in cases of shock and collapse treated by this method.

Where this treatment has extended over a considerable period and the quantity injected has been large, the condition of the bladder should be looked after. The technique of the operation is simple.

While any large superficial vein could be used to receive the solution, the median basilic has in a large majority of cases been selected. In some instances, according to the collapsed condition of this vein, it cannot be identified. The outline of the vein can be made prominent if a moderately tight bandage be applied around the arm just above the elbow and then have flexion and extension performed at the wrist. These movements will increase the blood-flow and distend the wall of the vein.

After the parts have been thoroughly cleansed and the forearm placed in a position of supination, an incision one inch in length should be made over the vein at the bend of the elbow and carried through the skin and superficial fascia. This incision will bring into view a layer of fat, which is very often seen and very rarely spoken of in our text-books. In all of my cases this layer of fat was present. With a blunt instrument the fat can be torn through and the vein exposed. Three catgut ligatures should be placed under the vein, and one of the ligatures should be drawn well down into the lower angle of the wound and immediately tied. An opening just large enough to receive the cannula should be made in the vein wall above the point where the ligature was tied. Into this opening the end of the cannula is introduced. A second ligature is now tied around that portion of the vein which includes the end of the cannula. This ligature not only holds the instrument in place, but prevents the entrance of air. After the required amount has been injected, the third ligature should be tied in the extreme upper angle of the wound above the end of the cannula. The cannula can now be taken from the vein, or that part of the vein between the upper and lower ligatures can be excised, removing the excised portion of the vein with the cannula in situation. The wound needs no drainage, is closed with several silkworm-gut sutures, and dressed with aseptic dressings.

In extreme cases of shock, hemorrhage or collapse the superficial veins may be so empty that they cannot be made prominent by the bandage and wrist movements. If the vein desired is not readily found, a transverse incision should be made in the subcutaneous fat across the line of the vein. This incision will divide the vein and the collapsed ends can be recognized. The lower end should be ligated and the upper end should be treated as in the above operation. The instrument used in conveying the solution must be as clean and as simple as possible. When there is no special instrument at hand for introducing this solution by the intravenous method, an ordinary glass or rubber syringe, with a piece of india-rubber tubing attached to its nozzle and a cannula attached to the other end of the tubing, will suffice. The cannula can be of glass or metal. A small goose-quill would answer equally well in emergency cases. One of the most convenient and safest instruments for this purpose is Collin's transfusion apparatus. It was used extensively for transfusing blood during the French and German wars and gives perfect satisfaction. This apparatus was used with success in the cases that I will speak of presently. Collin's instrument consists of a reservoir or basin which is funnel-shaped and holds about one pint. To the bottom of this basin is attached a glass syringe which holds half an

ounce and works like any other ordinary syringe. To the lower angle of this syringe is attached a rubber tube with a cannula at its end. The entrance to this tube is guarded by a hollow ball-valve made of aluminum, which completely excludes the air. The basin is filled with the solution, the piston is drawn back, and the barrel of the syringe becomes filled; the piston is then pushed, which drives the ball-valve up and allows the fluid to go through the tubing and cannula into the vein. After one syringeful is thus delivered the ball drops back over the entrance of the tube. To be sure that there is no air in the tubing or cannula, one syringeful should be emptied before the cannula is introduced. After the first syringeful is delivered it is impossible for air to enter. The basin should never be less than one-third full, and the solution in the basin can be kept at the proper temperature by constantly adding small quantities of the saline solution, hot or cold, according to the temperature of the fluid in the basin. While the presence of air in the vessels in small quantities has been shown by experiments not to be injurious, it is best to avoid it if possible.

I am inclined to think that the intravenous method of introducing the saline solution into the venous system would be used more freely if it were not for the disturbances that the air in the vessels is claimed to cause. And why should we fear the small amount that is liable to get in during this operation, when we are told by Hare that death only occurs when a pint or more has been introduced into the vascular circulation? The circulation can, no doubt, handle a small amount of air without fatal results. I have seen the internal and external jugulars and the axillary veins torn without any perceptible changes in the circulation, and I am sure in each case considerably more air gained entrance than could possibly get in during the operation for intravenous injection.

My experience with the saline solution used intravenously is limited to only four cases, though I have seen it used in other cases with good results.

Cerebral surgery is almost always accompanied by severe shock, particularly when there has been considerable blood lost, as happens when brain tissue is being removed. Profound shock is sometimes seen to follow exploratory operations upon the brain, even when nothing more has been done than exposing the dura.

While we are ready to admit that the shock caused by the removal of a limb at a joint is claimed by some to be modified if a portion of the limb had some time previously been removed, we know that no patient can have his clavicle resected, subclavian vessels ligated, brachial plexus incised, scapula, portion of the clavicle and arm all removed at one operation without considerable hemorrhage and profound shock. It goes without saying that an extensive resection of the lung tissue for disturbances caused by traumatism is followed by a hemorrhage which kills in the vast majority of cases.

The following cases, with the exception of the first, will serve to demonstrate the usefulness of the saline solution used intravenously for counteracting the effects of operations which ordinarily are accompanied by severe shock. While the first case that I will speak of throws no light on the use of the saline solution in cases of shock and hemorrhage, it shows us the effect this solution has when introduced into the vein of a person who has normal secretions, normal blood-pressure, normal temperature, and normal respirations. I believe it is the first case on record where the saline solution has been introduced into the circulation of a human being in whom the vital functions seemed in every respect normal.

Case I.—Joseph L., aged forty-eight, was admitted to the surgical wards of the Jefferson Medical College Hospital, July 28, 1896. Diagnosis: carcinoma of the tongue with extensive glandular involvement. The floor and sides of the mouth were so infiltrated that it was impossible to make a careful examination, so it was decided to give the patient ether, make a thorough examination, and if possible remove the diseased tissue. From the condition of affairs it seemed certain that the operation would be long and bloody. In view of this fact Professor Hearn asked me to be ready to administer the saline solution intravenously in case it was needed. On August 1, 1896, the patient was anesthetized, and while the mouth was being cleaned I exposed the median basilic vein and introduced into it a cannula attached to a Collin transfusion apparatus. The mouth of the patient was now forced open for examination. The tongue was found to be infiltrated throughout; it was dark, thick, and fixed. Its motion was so limited that it could not be brought forward. The disease extended to the pillars of the fauces, the soft palate, and the tonsils. The floor of the mouth, the

gums and the jaw bones were involved, also the cervical glands. After a most thorough examination, Professor Hearn concluded an operation in a condition like this would not only subject the patient to a great risk, but could not in any way prolong his life, and for this reason no operation was performed. The patient had now been under the effects of ether for fifteen minutes and he was none the worse for it, as his pulse was 81 per minute, temperature 98.6°, and respiration 20. Having everything ready for the intravenous injec ion of the saline solution, and thinking that no harm could befall the patient if a small amount was carefully injected, I did not hesitate to try to ascertain the effect of the saline solution in a patient whose vital organs were functionating properly. Dr. Meals, who was at this time resident surgeon to the women's surgical wards, kept his finger on the radial pulse of the left arm while I was injecting the solution into the median basilic vein of the right arm. His report was as follows:

Time.	Amount injected.	Pulse.	Respiration.
12.30 P.M.....	None.	85	20
12.32 P.M.....	Two ounces.	85	20
12.34 P.M.....	Two ounces.	81 (volume increased).	20
12.36 P.M.....	Two ounces.	79 (volume increased).	18
12.41 P.M.....	Two ounces.	71 (volume increased).	18

The patient soon recovered from the effects of the anesthetic and passed four and a half ounces of urine (his bladder was evacuated immediately before he was anesthetized).

This case is interesting from several points of view; it shows us that eight ounces of saline solution can be introduced, within a period of nine minutes, into the blood vascular system of an individual whose vessels are already filled without perceptible evidence of engorgement. It clearly demonstrates that the vital functions are increased by the presence of the saline solution within the circulation.

From the fact that the patient passed four and a half ounces of urine one hour after he had evacuated his bladder, and forty-five minutes from the time of the first injection and thirty-six minutes from the time of the last, it is reasonable to believe that the increased blood-pressure caused the kidneys to become active, and they were endeavoring to equalize the blood-pressure by getting rid of any superfluous fluid.

The case just spoken of being the only one in my list of five in which no operation was performed, I numbered it No. 1, so as to clear it of the operative cases, though it was the third to receive the solution. My first experience with the saline solution used intravenously was at the Orthopædic Hospital on June 5, 1896. The history is as follows:

Case II.—H. McD., aged twenty-eight, was admitted for the first time to the above named hospital on March 16, 1893. He was suffering from epilepsy, supposed to be caused by a brain tumor. On the 3d of April Professor Keen exposed a portion of the brain for exploratory purposes; nothing unusual was visible. A grooved director was passed into the right lateral ventricle; no tumor was found. The director was then passed about two inches down and back into the brain substance. Nothing abnormal could be detected, and it was decided if any tumor existed it was deep at the base of the brain. This operation was followed by considerable relief for a time; but later the epileptic attacks returned, and the patient was brought back to the hospital. Upon his arrival the second time his symptoms and physical signs of a cerebral tumor were prominent and the patient was very weak. On the 6th of June, 1896, Professor Keen reflected the portion of the scalp that overlay the tumor; the bone had been removed at the previous operation. The opening in the skull was enlarged, and through it two ounces and one hundred and fifty grains of diseased brain tissue was removed. This was attended by a fearful hemorrhage, and the patient was rapidly sinking. I was asked to give him an intravenous solution. This was my first experience with the solution used in this manner, and the inexperience, combined with a new transfusion apparatus which was minus an important washer, produced effects which were not as prompt and as satisfactory as they might have been, though I managed by perseverance and time to get into his vein enough of the fluid to have a mild effect on the circulation. He was somewhat shocked after the operation, but soon reacted and recovered from the operation.

Case III.—W. H. B., aged twenty-eight, was admitted to the Jefferson Hospital on July 11, 1896. Diagnosis: tumor of the brain near the cuneus. He was suffering with terrible headaches, was very weak, and hardly able to walk. There was a history of progressive loss of strength, weight, and sight. When admitted he had right lateral hemi-

anopsia and passed large quantities of urine, the amount varying from ninety to one hundred and twenty ounces in twenty-four hours. The original history of this case could not be found, and I am indebted to Dr. J. Roe for the above interesting facts connected with it. My notes of the case show that he was operated upon on August 5, 1896. After he was anesthetized his condition was somewhat alarming; the pulse was rapid and weak, 132 per minute, respiration 24 and shallow, skin cold and clammy. Professor Hearn was about to send him back to the wards without touching him with an instrument, and would have done so if his condition had not improved under the use of the saline injection. The operation lasted fifty minutes and consisted of opening the skull and exploring the brain with finger and dural separator. Nothing was found to account for the disturbances. Dr. Dengler, chief anesthetist at the hospital at the time, and Mr. Sciple, a third-year student kindly paid particular attention to his pulse and respiration while I was injecting the solution. They furnished me with this report:

Time.	Amount injected.	Pulse.	Respiration.	Face.
1.07 P.M...	None.	132	24	Pale.
1.09 P.M...	Three ounces.	132	24	Pale.
1.15 P.M...		130*	24	Pale.
1.19 P.M...	Three ounces.	130*	24	Pale.
1.23 P.M...		124*	23	Pale.
1.26 P.M...	Three ounces.	124*	23	Pale.
1.28 P.M...	Three ounces.	120*	22	Pale.
1.30 P.M...	Three ounces.	110*	20	Pale.
1.35 P.M...	Three ounces.	100†	19	Little color.
1.42 P.M...	Three ounces.	90†	19	Fair color.

*Volume increased. †Full.

1.51 P.M. Patient shows signs of throwing off the anesthetic.

1.51½ P.M. Cannula removed; patient in fair condition.

The patient made a rapid recovery from the operation.

I am sorry that I cannot show a complete history with the urinary report of this case, but the facts as they stand show that a person considerably shocked from disease and the anesthetic can be benefited by the introduction of a warm saline solution into the circulation. A reduction of the number of heart-beats from 132 to 90, with increased volume during a period of forty-four minutes, shows the value of administering the solution while the person is passing from shock into what would be in a little while extreme shock. Following the pulse-rate and volume in this case from the beginning of the first injection to the time the operation was completed, it substantiates what I said a few moments ago in regard to the influence of a warm solution introduced into the right side of the fluttering heart.

CASE IV.—J. M., aged twenty-eight, was admitted to the Jefferson Hospital on May 26, 1896, suffering from the effects of a recurrent carcinoma of the upper third of the right arm and shoulder. The arm had on a previous occasion been amputated at the middle third for a carcinoma, which began in the thumb and was gradually extending up the forearm. On June 3, 1896, Professor Hearn removed the entire upper extremity, including the scapula and outer two-thirds of the clavicle. The operation was preceded by resection of the clavicle and ligation of the subclavian vessels. The patient was cold, and in a perilous operation like this severe shock seemed inevitable. Dr. Gilbert, then surgical resident in the men's surgical ward, assisted me in looking out for the patient's general condition. By the external application of heat and the introduction of twenty ounces of warm saline solution into his median basilic vein, he suffered very little shock and soon recovered from the operation.

CASE V.—G. P., aged eighteen, was admitted to the Jefferson Hospital on June 17, 1897. Diagnosis: Gunshot wound of the chest. On admission his pulse was 100, respiration 32. Soon after admission he became delirious, pulse increased to 132 per minute, and his skin became cold and clammy. He showed all signs of internal hemorrhage. Accordingly, Prof. J. Chalmers DaCosta aspirated, and, finding blood, followed this by resecting three ribs, opening the pleural cavity, removing necrotic lung and pleural tissue, ligating a number of vessels in the lung, and packing with sterilized gauze. The blood that escaped through the wound in the chest was caught in a bucket, and it amounted to half a pint over a gallon. To counteract the effects of this, two quarts of the normal salt solution was used intravenously. Professor Da Costa thinks that the intravenous injection saved his patient's life. (I had nothing to do with the administration of the saline solution in this case, nevertheless I am glad to report it with my own cases, as it admirably shows the effect of this fluid in an operation on a vital organ with a considerable loss of blood.)

Dr. Lewis A. Stimson (*Medical News*, Dec. 19, 1896) reports a number of cases of pure shock which he treated with the intravenous

injection of the saline solution. Three of his cases were accident cases, and when admitted to the New York Hospital were in a condition of extreme shock. They recovered under the use of the saline solution.

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*SCHEDE'S OPERATION FOR AN OLD EMPYEMA; CATHCART'S DRAINAGE; RECOVERY.**

By W. W. Keen, M.D.,
Professor of the Principles of Surgery and of Clinical Surgery, Jefferson Medical College, Philadelphia.

J. F. S., aged twenty-four, was sent to the Jefferson Medical College Hospital by Drs. John and George Potteiger, of Hamburg, Pa., December, 1895. His family and personal history are negative, excepting that at twelve years of age he had an attack of chorea, which lasted for a year and recurred slightly a year later, but has never returned.

In April, 1895, between eight and nine months before his admission, he had a left-sided pneumonia followed by pleurisy with marked bulging of the precordial region. This was incised, and drained on May 30. A second incision was needed at a later date, and a third about the 1st of August. On admission there was no healthy breath sound over the entire left side of the chest. The left chest wall was considerably flattened, especially at the upper portion. The apex of the heart was displaced two inches to the right. Specific gravity of urine 1.032; neither albumen nor sugar.

Three sinuses still existed at the point where the incisions were made (Fig. 1). Evidently the attempt by Nature to cure by approximating the chest wall had not succeeded by reason of the rigidity of the chest wall. This, from the long-continued suppuration, I deemed to be probably due as much to the thickened pleura as to the ribs.

Operation December 4, 1895. I first made an incision connecting the various sinuses and removed the diseased tissues around these apertures. An opening into the interior of the chest was found between the fifth and sixth ribs just in the nipple line. A long probe reached upward as high as the clavicle, downward to the diaphragm, and backward to the posterior wall of the chest. A long curved incision was made extending from the first incision to the scapula. The flap covered most of the side of the chest. The incision was made directly down to the ribs, and all the soft parts external to the ribs were lifted. Beginning then at the opening into the chest cavity, by a large pair of bone pliers I divided all the tissues of the chest wall up to, but not including, the second rib, downward to the diaphragm, and at the upper and lower extremities of this incision I divided the entire thickness of the chest wall well back under the anterior edge of the scapula, and vertically between the ends of these last, thus removing the wall of the chest (except the flap) from the third to the eighth ribs inclusive. The pleura was nearly an inch thick and its cavity was filled with pus. The left lung was obliterated and bound to the inner side of the apex of the left chest; the pleuro-pericardium forming a vertical diaphragm about an inch inside the nipple line. The entire surface was curetted

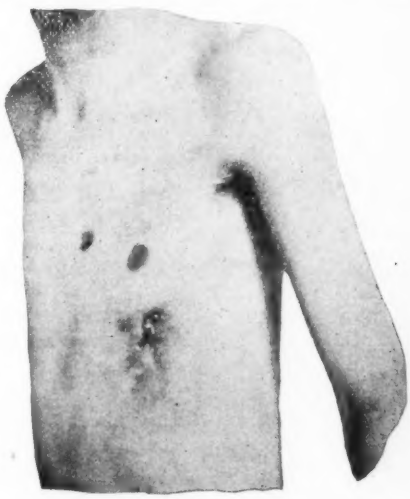

Fig. 1.

and lightly packed with iodoform gauze. The flap was then sutured in position, except at an opening below for drainage. My intention in suturing the flap except a small drainage opening was to obtain its adhesion to the soft parts as far as I could. I then intended in three or four days to cut the sutures at the apex of the curve so as to get more room for drainage and packing; especially would the drainage be good when he was in the erect posture. No trouble was experienced with hemorrhage. The bone forceps apparently arrested the hemorrhage by crushing. The ribs were adherent to each other.

After the operation his temperature fell to 95.6°, but by the fourth day had gradually risen to 102.2°. On the sixth day it had

*Read before the Surgical Section of the College of Physicians, April 9, 1897.

fallen to the normal and remained so till he was discharged.

I found, after the first few days, that the abundant suppuration in the old cavity of the pleura was not freely drained by the gauze, and accordingly I applied the apparatus of Mr. Cathcart as modified by myself (*Annals of Surgery*, February, 1896). This kept the cavity entirely free from pus.

At the time of the operation the cavity held considerably more than a quart of pus. In two weeks there had been such contraction that it held less than a pint. He was discharged on January 22, 1896. There was still a small fistulous opening, leading to a cavity holding about three ounces. By the end of February it only held two ounces, and the falling in of the flap was rapidly advancing toward cure.

The operation that I did in this case, and also in another (*Annals of Surgery*, June, 1895), is not precisely that of Schede in its details, but practically is the same, and I have therefore called it by his name, though I employed it in my first case without knowing that Schede had ever done it. His original paper will be found in the *Verhandl. d. Cong. Innere Med.*, 1890, p. 41. Schede's operation is not as well known in this country as it ought to be. Ferguson (*Journal of the American Medical Association*, Jan. 9, 1897) in reporting a case stated that in looking through American medical literature he had not been able to find any other case whatever, overlooking the first case of my own to which I have just referred. Estlander's operation (thoracoplasty) is very well known and finds a place in all the text-books. Schede's, which is a radical improvement of the same, receives bare mention in the recent systems of Park and Dennis, and is not even referred to in Mr. Treves' System of Surgery or in his Operative Surgery. The American Text-book of Surgery describes the operation quite fully.

The operation of Schede is especially applicable to very old cases in which the pleura, as in the present case, reaches the thickness of an inch or an inch and a quarter. It is very evident that mere removal of the ribs, leaving such a thickened pleura, will do no good, since the pleura is so stout and firm that it preserves the arch of the chest wall and therefore the cavity persists. Accordingly, the principle of Schede's operation is to make a flap of the soft parts down to the ribs, and then remove ribs, intercostal muscles and thickened pleura entirely. The flap, which has been raised, is then replaced so that the skin and subcutaneous tissues lie directly on the inner side of the old thickened pleura, which should be thoroughly curetted before the flap is replaced.

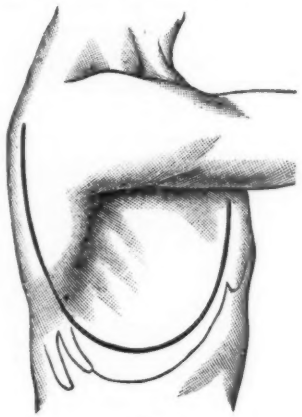

FIG. 2.

The incision begins (see Fig. 2) at the level of the axilla in front, extends below to the lower border of the pleura, and then curves upward posteriorly to the level of the second rib between the scapula and spine. The entire soft parts (including the scapula) down to the ribs are then raised. All of the ribs from the second or third downwards and from the costal cartilages to the tubercles are

FIG. 3.

removed. The thickened pleura is then, in the entire extent of the wound, split, and with the intercostal muscles are removed with a strong shears. In both of my own cases I have not first resected the ribs and

then the pleura as was done by Schede, but I have divided the entire chest wall under the soft parts by a strong pair of bone pliers. If the intercostal arteries bleed they are, of course, ligated. In my own cases I did not have to ligate any of them. Apparently the crushing of the forceps jaws prevented the hemorrhage. After thorough curetting of the visceral layer of the pleura, the flap is then laid upon the lung and pleura where it usually heals *per primam*, with an immediate subsidence of the fever. In both of my own cases I have found it necessary to drain for a considerable period. The best method by far of accomplishing this object is by the Cathcart drainage.

The same free motion of the arm which I obtained in my first case is equally evident in the present case (Fig. 3). The left lung has expanded more than I had believed possible—to the third rib. There is a marked left dorsal lateral curve, so that the vertebral ends of the ribs reach the posterior axillary line. The whole left chest wall is unexpectedly firm and protects well the heart, the pulsation of which is very evident and is still displaced to the right.

THE INFLUENCE OF THE X-RAY METHOD OF DIAGNOSIS UPON THE TREATMENT OF FRACTURES.

By Charles Lester Leonard, A.M., M.D.,
Department of Clinical Surgery, University of Pennsylvania.

The discovery of a new and more accurate method of diagnosis, or of a shorter and more effective treatment, is always welcomed by the profession with an enthusiasm and eagerness which is often in excess of the true value of the method; and it is only after a long and severe trial that its merit can be determined.

Roentgen's discovery and its application to surgery was no exception, but during the two years that have elapsed since its introduction, the *x*-ray has demonstrated its scientific value even to the most skeptical. There have been many failures where it has been employed, and many foreign bodies "located" that could not be removed. These failures, however, were not the fault of the method *per se*, but of the crude and inaccurate manner in which it was employed. Accurate results can never be obtained by crude methods or instruments, and now that methods and instruments of precision have been introduced in the application of the *x*-ray to surgery, these failures are rapidly decreasing in frequency, and as experience grows greater will become practically unknown.

It cannot be expected of any new method of diagnosis that it will replace or at first even equal methods which have attained accuracy and scientific precision by the study and experience of generations of observers, and yet this new method of diagnosis has already produced results which markedly affect the treatment of certain forms of fracture.

The amount of accuracy and the additional knowledge which can now be obtained by the aid of the *x*-ray picture is very great, and the practitioner who desires the best functional result for his patient will demand this additional aid in making his diagnosis complete and determining the best method of treatment; or at least will have skiagraphs taken to show the correctness of the treatment and to determine when changes should take place.

Fractures occurring in the shaft of long bones are not greatly benefited by this method unless it be in those difficult cases where the symptoms are rendered obscure by the thickness of the limb, the form of the fracture, or the contiguity of a neighboring sound bone. The greatest service which the *x*-ray renders is in the exact determination of the form of fracture in those difficult cases where a joint may be involved. The rapid swelling which always follows an injury near a joint renders the diagnosis difficult, while the exudate destroys any marked crepitus. Thus the determination of the exact line of fractures makes possible the adoption of a line of treatment, which would otherwise often be impossible. The point where danger is to be expected from exuberant callus, or the blocking of the joint by overlapping of the fragments, is made clear and readily avoided by appropriate treatment, which instead of being general and applying to all forms of injury about a joint, may be directed to the treatment of that particular case, with a much better functional result. In many instances fractures that lie wholly within the capsule of the joint and thus escape detection are distinctly shown and are rendered amenable to treatment other than that for "bad sprains."

Many fractures which have been described as rare have been shown by this method to have been rarely detected, while the exact determination of the form of the fracture and the recognition of minute comminuted frag-

ments have rendered coaptation more precise and the result of treatment more perfect.

In cases of delayed union or of ununited fracture, or where fibrous union is suspected, the *x*-ray picture shows the presence or absence of bone salts in the callus, the line of fracture in cases of fibrous union, or the maladjustment of the fragments, which has caused the poor result, while it aids the surgeon in determining the exact treatment necessary for the individual case.

The influence of this knowledge on treatment can scarcely be estimated, but the functional results obtained in many cases prove its great value. To secure the best results accurate methods must be employed and skiagraphs must be taken from more than one point, as inaccurate methods are liable to produce distorted images and a single picture may show the least deformity. One of the greatest influences of this method upon the treatment of fractures is the change it is bringing about in prognosis. Antisepsis has robbed the compound fracture of its gravity, and the skiagraph has shown that in many cases the simple fracture is much more dangerous and liable to be followed by greater deformity and loss of function, and that its name is often a misnomer. This result has produced a strong influence for a change in our nomenclature of fractures, the terms open and closed being substituted for simple and compound.

The most important change produced has been in the treatment of certain "simple" fractures, and the old but true saying applied by Sir Benjamin Ward Richardson to the treatment of obscure abdominal injuries should be applied to many of these simple fractures: "Because we are in the dark let us let in the light."

The *x*-ray has enlightened the darkness of fracture diagnosis and has shown that advancing surgery demands that we let the daylight into our treatment of many of these cases; they should be laid open and the bone exposed to the eye of the surgeon. Under perfect asepsis there is no danger commensurate with the advantages gained. Blood-clots can be removed, perfect approximation can be secured and maintained by appropriate wiring, pegging, or plates, and overlapping and distortion absolutely prevented.

Gross lesions and irregularities in outline can be detected with the fluoroscope; minute detail and accurate knowledge, essentials in the directing of treatment, can only be obtained in skiagraphs. The fluoroscope, however, may be used with effect in the adjustment of the fragments, the symmetry of the bones and the interosseous spaces being maintained with greater accuracy. After the fracture has been set and the dressings applied, a skiagraph taken through the dressings gives absolute proof that the proper adjustment has been made.

Among the fractures to which the author has applied this method of diagnosis with great benefit to the after-treatment are: Fractures of the phalanges; Colles' fractures; fracture of the styloid process of the ulna, its shaft, the coronoid process, the olecranon; fractures of the shaft of the radius, its surgical neck; intracapsular fractures of the articular surface of the humerus, various fractures of its condyles entering the joint; supracondyloid fracture; fracture of the shaft, the surgical neck; fractures of the coracoid and coronoid processes of the scapula; simple, comminuted and green-stick fractures of the clavicle; fractures of the lower jaw; fracture of the axis; fractures of the femur in various parts of the shaft and condyles; fracture of the patella; fractures involving the articular surface of the tibia; spiral fractures of the tibia with fracture of the fibula; various forms of Potts' fracture, including chipping off of the posterior articular surface and linear fracture of the external maleolus; fractures of the astragalus, the os calcis, the metatarsal bones, and phalanges; and besides numerous instances of epiphyseal separation. In these latter cases the diagnosis is extremely valuable on account of the absence of ordinary symptoms, and the bearing upon treatment is always very great. In all cases where a former injury existed and a refracture has taken place, or a fracture of a neighboring bone, the service rendered is always very great, as the old distortion renders the accurate setting of the fragments almost impossible, as the normal can never be attained. Here, therefore, the treatment is markedly benefited by this method.

The majority of the cases studied were brought to the laboratory; many of them were private patients, while in a number of instances where the patient was unable to come to the laboratory the skiagraphs were made by his bedside. The benefits of this method of diagnosis upon the treatment of fractures is not restricted to hospital practise; developments and improvements in construction make the apparatus readily transportable and render its use in general practise possible.

There seems to be no doubt that the only

ground for damages in suits for malpractise must be, as formerly, based upon expert testimony as to the amount of deformity and functional disability of the patient. The skiagraph can only show that the fracture had been properly set by the surgeon, and that the resulting deformity was the fault of the patient. Skiagraphs of old fractures with perfect functional results do not show symmetry, and it should not be demanded, unless the patient allows the surgeon a better opportunity, as by open operation, for treating.

There is, however, reasonable ground for holding that unless a skiagraphic examination of the fracture has been made, or at least suggested by the practitioner and declined by the patient, it cannot hereafter be said that where functional disability exists the practitioner has employed all reasonable and ordinary means, to the best of his ability, in the treatment of the fracture.

1930 CHESTNUT STREET.

NOTE ON THE DRAINAGE OF LARGE CAVITIES AFTER SURGICAL OPERATIONS.

HEATON in the *British Medical Journal* of January 22, 1898, says when a hollow organ such as the urinary or gall-bladder has been opened, or when a large suppurating cavity has to be drained, the surgeon after his operation often has much difficulty in keeping the patient and his dressings dry and clean. If it be some intraperitoneal structure, such as a suppurating gall-bladder, liver abscess, or suppurating pelvic cyst which has been opened and then stitched to the parietal peritoneum, some efficient method of drainage during the first few days becomes of vital importance. The leakage of pus or other irritating fluid in the first few hours after the operation, before the cavity of the peritoneum has been shut off by plastic inflammation, has frequently been the cause of a spreading fatal peritonitis. But even when a hollow organ has been opened without involving the peritoneum—as in the case of a suprapubic opening into the urinary bladder—if the discharge be at all profuse, there will be considerable difficulty in keeping the dressing dry. It is only by an almost constant changing of dressings and the use of large quantities of absorbent materials for collecting the escaping urine that the patient can be kept at all dry and clean; and despite every care in nursing, the bed is apt to get wet and the patient chilled.

During the past twelve months the writer has tried several modes of drainage with a view of obviating this, and has at length found one which he believes to be both simple, efficient, and inexpensive. He lays no claim to originality in the principle of the apparatus. The idea, indeed, was suggested by seeing the siphon arrangement used by dentists for the mouth during their operations.

The principle of the apparatus is the keeping up of a continuous slight siphon action from the cavity to be drained by means of a modified Sprengel's pump. Only sufficient suction is required to keep up a siphon action; indeed, any powerful suction is apt to be injurious to the tissues of the patient.

The apparatus consists of a reservoir capable of holding about two gallons, which is connected by means of the tube with the upper limb of a glass Sprengel pump, which is usually fixed to one of the legs of the patient's bedstead. The side tube of the pump is connected by means of a second piece of drainage tubing with a perforated glass bulb, which is placed in the cavity to be drained.

When water is allowed to trickle very slowly from the reservoir through the pump into a pan placed below to receive it, sufficient siphon action is maintained in the side tube to remove even the smallest quantity of fluid as it collects in the cavity to be drained, and this passes down with the water from the reservoir into the vessel beneath the bedstead, leaving the patient and his bed quite dry.

The chief difficulty experienced was in securing a satisfactory glass ending to be placed in the cavity. When an ordinary piece of glass tubing was used, or one perforated at the sides, the wall of the cavity to be drained was soon sucked into the open end and lateral openings, giving the patient pain and putting an end to all siphon action.

This difficulty is overcome by having two tubes, an outer one perforated at the sides, which encloses an inner one which is connected with the pump. Fluid as fast as it collects in the cavity trickles through the perforations of the outer tube, and is then sucked up by the open end of the inner tube. Several such glass endings have been tried, varying in size and shape with the wound and cavity to be dressed.

During the past six months the author has used this apparatus on six patients after operation.

The Therapeutic Gazette

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Leading Articles.

THE TREATMENT OF EXCESSIVE TYMPANITES.

There are three conditions in which excessive tympanites becomes a symptom of considerable importance, namely, typhoid fever, intestinal obstruction in its various forms, and in forms of pulmonary disease, chiefly pneumonia, in which the pressure of the gas upon the diaphragm and the thoracic viscera gives the patient much distress. Of course there are many other diseases in which a considerable quantity of gas may form at times in the stomach and intestines, yet it is in these three instances that we have named that it most frequently gives rise to serious discomfort or even danger. Under these circumstances the question at once arises as to what is the best method to give relief to the patient. In the majority of cases of typhoid fever this condition can be prevented, if the patient is seen early in his attack, by a proper direction of the diet and control of the bowels, using mild purgatives when they are needed to overcome constipation and mild antiperistaltics when diarrhea becomes excessive. In a proportion of cases, however, even these precautions are not successful in warding off this complication, and under these circumstances it is our custom to direct that a turpentine stupe as hot as the patient can bear shall be placed over the abdomen and allowed to remain until it produces considerable counter-irritation. The period during which it remains in contact with the skin varies of course with the susceptibility of that patient's skin to this irritant. It may be that other counter-irritants are equally useful, but experience has seemed to indicate to us that turpentine is the most efficient.

If the tympanitic distention is not relieved by this application, a rectal injection of two to four ounces of milk of asafetida, pure or diluted half with water, is resorted to, and if this does not give relief a few drops of turpentine are added to a fresh injection of milk of asafetida, care being taken that the turpentine is thoroughly broken up in the asafetida emulsion so that no separate drops of the irritant oil will come in contact with the rectal mucous membrane. In other cases turpentine made into an emulsion with starch water, or thoroughly mixed with sweet oil, and given by rectal injection is equally efficient; but if all these remedies fail, then the rectal tube passed well up into the sigmoid flexure as far as possible and as gently as possible will generally allow the passage of the wind. Should these comparatively moderate means fail to give the patient relief, the question at once arises as to what other means there are at our disposal, and in this connection it is interesting to recall the very careful and able studies made by Ogle, of London, a number of years ago upon the subject of puncture of the abdomen for excessive tympanites. This investigator has collected from the experience of a large number of medical and surgical friends a great number of cases, which he has placed together in a complete essay. The result of his study is that in a certain proportion of cases puncture of the abdominal wall and intestine is safe and expedient and often followed by good results, and that in cases which are necessarily fatal its use will often render the patient's death much more easy than had the distention been allowed to remain or increase.

In Ogle's studies it was found that the operation is suited chiefly to those cases which have distention of the colon and stomach, for the numerous coils and kinks

of the small intestine and the fact that its caliber is much less than either of the viscera which we have named render accurate puncture difficult unless the knuckle of distended gut is particularly prominent. It seems evident, too, that puncture of the stomach is rarely if ever justifiable, because great distention of this viscus can nearly always be relieved by the use of the stomach tube or esophageal tube. It is only when grave obstruction to the esophagus or cardiac orifice exists that puncture for distention of this organ is permissible. Ogle believes that incurable cases of bowel obstruction are relieved of their most distressing symptoms by this means, and that curable cases are greatly aided by it since by this means vital organs are relieved from pressure and purgative drugs which before the gas was withdrawn could not move the bowels have an opportunity of unloading them.

It goes without saying that in making the puncture careful antiseptic precautions as to the condition of the nails and the patient's skin over the abdominal area are to be taken. The skin should be as carefully prepared as it would be for an abdominal incision, and the cannula or hypodermic needle which is used for puncturing purposes should be as small as possible in order that the wound in the abdominal parietes and particularly in the wall of the gut may be so minute that the muscular fibers will immediately close it when the needle is withdrawn. Further than this, if a large needle is used which has to be reinforced by a trocar passed through it, this trocar, the point of which should be sharp, should not have triangular edges but be perfectly round, in order that the puncture can remain open; and, again, as there is a certain amount of danger in withdrawing the needle of infecting the peritoneum or the abdominal wound by minute portions of the intestinal contents which may adhere to the needle, it may be advisable to allow a small quantity of saline fluid to flow inwards through the needle while it is still *in situ* after gas has ceased to come away from it, in order that any intestinal contents in its caliber may be washed back into the bowel and not withdrawn into the wound. When it is considered what grave insults the peritoneum will receive without resentment when it is in a healthy condition, the danger of infection in the way that we have hinted at cannot be very great. On the other hand, it is not to be forgotten that in case of intestinal obstruction in particular the susceptibility of the peritoneum to infection is greatly increased. It is better to make a number of punctures in various portions of the bowel for the purpose of relieving the gas, using in each instance a fine cannula or needle, than it is to use one or two punctures with a large cannula. Ogle asserts that fecal extravasation has never in his experience followed such punctures, nor have they given rise to adhesions; and, further, that should more serious operative procedures be required these punctures in no way increase the danger to the patient. In an editorial which was published in the *Medical News* some years ago the writer mentioned a case in which the ingestion of a number of pigs' feet which lodged in the lower colon caused intestinal obstruction to such an extent that all purgatives and injections were futile, and yet the cardiac distress was so great as to force the writer to the use of hypodermic needles, which were inserted at various points along the course of the colon. Gas rushed through these for fifteen minutes before the colon became entirely collapsed, but after its collapse the purgatives, which had been administered, acted and the obstruction was removed. Recovery followed.

We have called attention to this means of treatment of severe tympanites not because we think it should be used in many cases, but because it seems a justifiable operation in some instances. It is not to be resorted to carelessly, nor until every other means of greater safety for the removal of the flatus has been carried out; but as a last resource which will sometimes succeed, sometimes fail, in relieving the distention, and which is not so dangerous as to seriously imperil the patient's recovery. We believe that the physician should always remember this method of giving relief.

THE QUESTION OF DIET IN TYPHOID FEVER.

One of the gravest dangers which threatens the continuous success of the busy practitioner is the tendency to relapse into what is known as routine treatment, which consists either in prescribing identical preparations to patients with the same general disease, but with different manifestations, or adhering rigidly to fixed lines of diet when a little thought and care would enable him to vary the diet, and so improve the nutrition of the patient. At least he need not enforce strict adherence to a particular line of food products.

In no disease is the importance of liberal feeding greater than in typhoid fever, for in this malady the patient, through a number of weeks, has his strength continually sapped by fever, diarrhea, and the various complications of this malady, with the result that at the end of even a mild attack he finds himself in convalescence miserably weak and lacking both nervous and muscular energy. It is a noteworthy fact, familiar even to the laity, that this lack of power of mind and body often lasts for many months after apparent recovery has taken place. The question naturally arises whether this atony and asthenia are an unavoidable consequence of the disease, and if so, whether it is possible to modify them to such an extent that convalescence may be more rapid and that recovery from the attack itself may be the sooner arrived at. It has been the custom of a great number of the profession for many years to order an absolute milk diet for patients suffering from typhoid fever, and to continue them on this diet for a number of days or even a week after the fever has disappeared and the temperature of the patient has been normal. Further than this, this diet is frequently insisted on when complications of typhoid fever arise which still further aid in decreasing the patient's vitality, and often a milk diet is insisted upon when it seriously disagrees with the patient, who because of idiosyncrasy, or because of some complication of his disease, is unable to digest milk properly. We have reached these conclusions not only from general and personal experience in which we have recently had ample opportunity to become convinced of this matter, but by reason of an article published by Dr. Frederick C. Shattuck, of Boston, upon this topic. After some general considerations he tells us that from 1886 to 1893, 233 cases of typhoid fever were treated in the Massachusetts General Hospital under a milk diet, with a mortality of ten per cent.; from 1892 to 1897, 147 cases have been treated under a much more extended diet, with a mortality of 8.1 per cent. He recognizes fully the liability to error in reckoning from too small figures in any infectious disease, and while he does not urge that this slight decrease in mortality may have been due to the more liberal diet allowed, it certainly points to the fact, as he thinks, that the more liberal allowance of food has no deleterious influence.

Dr. Shattuck believes that we should treat the patient rather than the disease, and feeding him with reference to his digestive power rather than solely with reference to his fever, particularly as there are many other articles of diet than milk which can by no possibility exercise a harmful influence upon the intestinal ulceration. The diet list which he allows and which would certainly be considered very liberal in the average hospital and in many cases of private practise is as follows:

1. Milk, hot or cold, with or without salt, diluted with lime-water, soda-water, apollinaris, vichy; peptonized milk; cream and water (*i.e.*, less albumen); milk with white of egg, buttermilk, kumiss, matzoon, milk whey, milk with tea, coffee, cocoa.

2. Soups: beef, veal, chicken, tomato, potato, oyster, mutton, pea, bean, squash; carefully strained and thickened with rice (powdered), arrowroot, flour, milk or cream, egg, barley.

3. Horlick's food, Mellin's food, malted milk, somatose.

4. Beef juice.

5. Gruels: strained corn-meal, crackers, flour, barley-water, toast-water, albumen, water with lemon-juice.

6. Ice-cream.

7. Eggs, soft boiled or raw; egg-nog.

8. Finely minced lean meat, scraped beef; the soft part of raw oysters; soft crackers with milk or broth; soft puddings without raisins; soft toast without crust; blanc mange, wine jelly, apple sauce, and macaroni.

There are several articles in this list which we believe few, if any, typhoid fever patients ought to receive, and these are the soups, the beef juice, and the finely minced lean beef. In our experience all of these preparations tend to produce or to aggravate pre-existing diarrhea; and beef broth, as is well known, provides a very favorable culture medium for the typhoid bacillus. We have frequently seen the use of animal broths substituted for milk, and active, ill-smelling diarrhea with great flatulence has followed. To the list just given we may add soft cup-custards, and instead of limiting the patient to milk with white of egg we have recently seen most valuable results follow the administration of egg boiled just long enough to take away its raw taste and yet not to harden the white. From one to six eggs prepared in this manner and administered to the patient by means of a spoon or in a cup, if he is strong enough to drink the egg, will do much towards maintaining strength, particularly in those cases where milk disagrees.

THE IMPORTANCE OF MAINTAINING BODILY TEMPERATURE DURING OPERATIONS.

We have from time to time called attention in the GAZETTE to the great necessity of maintaining bodily temperature after severe injuries and during surgical operations: First, because the operation usually necessitates considerable exposure of the patient's body; second, because the anesthetic, which is used, of itself aids very greatly in the dissipation of heat; and third, because heat is an absolute necessity to the proper carrying out of vital functions. Curiously enough, this very valuable aid to the maintenance of vitality is largely ignored by surgeons and physicians, and the writer has frequently seen patients suffering from the results of severe hemorrhage no more warmly covered than the average ward patients, and very rarely he has seen such patients provided with a sufficient amount of external heat properly applied to be of material advantage. It is true that surgeons almost invariably surround patients after an operation with hot bottles or hot-water bags, but this is equivalent to locking the door after the horse is stolen. It is much better for the patient that measures be taken before and during the operation to maintain his temperature. By so doing we firmly believe that many cases of severe bronchitis, pneumonia and suppression of renal function by reason of congestion will be avoided. In other words, it is our opinion that a certain proportion of the respiratory and renal difficulties which arise after the use of an anesthetic depend more upon the exposure to which a patient has been subjected than to the effects of the drug which he has inhaled.

The well known experiments of Lauder Brunton, who proved that rabbits could take, with impunity, otherwise fatal doses of chloral if the animals were provided with external heat, indicate the necessity of this means of treatment in cases of poisoning by depressant drugs, and the fact that investigators of the motor area of the cerebrum invariably place the monkey, or other animal upon which they are experimenting, upon a hot-water bed is another indication that patients may be benefited by a similar line of treatment. Indeed, one world-famous investigator in this line informed the writer of this editorial that all his early experiments upon cerebral localization were handicapped or rendered useless by the grave depression into which the monkeys which he had experimented upon speedily passed when etherized, or chloroformed, if not supplied with external heat. Further, that without this external heat they all invariably died after recovery from the anesthetic. As soon as the hot-water bed was provided for them almost all, if not all, invariably recovered. Although this is a matter which the writer of this editorial has emphatically insisted upon in his Text-book of Therapeutics and to his classes at the Jefferson Medical College for a number of years, attention has again been called to it by a paper published by Dr. John S. Miller, of St. Joseph's Hospital, Philadelphia, upon the "Application of Heat in Anticipation of Surgical Shock as a Prophylactic Measure."

In discussing the vital necessity of maintaining bodily temperature in traumatic and nervous shock, and the still more vital necessity of regenerating heat after it has been dissipated, Dr. Miller has published a figure showing an arrangement by which long hot-water bags, of similar size and shape to those used for sawdust in the fixation of a limb after fracture, may be placed between the limbs and alongside the patient in order to provide him with sufficient heat. He also concludes his paper by that frequently repeated yet constantly needed warning that the patient, while partially anesthetized by shock or by a drug, shall not be burnt by bringing in contact with his body a brick, iron or hot-water bag containing sufficient heat to produce a burn. Even under the care of the most skilful surgeons nurses will at times in the hurry of completing the patient's toilet and arranging the bed surround him with bottles which produce severe burns, and we have recently met with a case in which the patient was confined to her bed for one week because of the operation itself, and then for four weeks more in order that a severe burn of the thigh and calf produced in the manner spoken of might have an opportunity to heal. The application of heat is therefore much like the application of any other remedial measure; it must be employed at the right time, in the right place, and in the proper degree.

THE TREATMENT OF GONORRHEA BY PROLONGED INJECTIONS OF PROTARGOL.

When so many new drugs are exploited before the profession, often for distinctly commercial reasons and on insufficient clinical data, we have reason to be conservative

in accepting any one person's dictum in regard to the greater efficacy of a new preparation. When, however, a man as well known for his careful scientific work as is Neisser announces that he has had better, quicker and more permanent results from the use of protargol in gonorrhea than from any other single or combined remedies, this statement is worthy of serious attention and the drug should be given an extended trial.

Neisser prefaces his remarks on this comparatively new silver salt by some observations on irrigation treatment which he characterizes as difficult of execution, as no more efficacious than other methods in the large proportion of cases, and as likely to be attended by serious complications. With all these contentions those most experienced in irrigation will be inclined to disagree. Neisser himself acknowledges that in individual obstinate cases he employs this method. Hand injections, however, he characterizes as simple and readily applied by the patient. The syringe should contain at least 2½ to 3½ drachms, and the physician must see that the patient understands precisely how the injection is made. The ideal medicament is one which will not be irritating to the mucous membrane, but will none the less act as a germicide upon the gonococci. He has tried silver nitrate, argentum, ichthyol, and oxycyanate of mercury, but far superior to all these he finds protargol. This contains 8.3 per cent. of silver. It is a chemical combination of silver with proteid and forms a yellowish, fine powder which is readily dissolved by being shaken with water. This solution is not precipitated by dilute sodium chloride or hydrochloric acid, hence it is likely to penetrate deeply into the tissues.

In solutions of one-fourth to one per cent. argonin it is practically not irritating. A continuously acting application can be made, since there is no chemical combination by which the salt is decomposed. Long-continued application is particularly potent. This may be accomplished by single injections which are kept in the urethra for thirty minutes. The method of procedure is as follows:

First, search is made to determine whether gonococci are present, whether they are present in both the posterior and anterior urethra, and whether they are present in threads pressed out of the prostatic follicles. When these latter show gonococci, instillations are used. Injections are repeated thrice daily after urination. Twice the liquid is kept in the urethra for five minutes, the third time for thirty minutes. The more abundant the secretion the more frequent the injections. Shortly, often in a very few days, these prolonged injections can be discontinued, and finally two of the injections can be made of the ordinary astringents, such as two and a half per cent. suspensions of bismuth or of thioform or of xeroform, employing as a suspension medium water or boric acid solution, or one-fourth-per-cent. zinc sulphate solution or twenty-per-cent. glycerin.

The great convenience of the treatment lies in the fact that the patient is not compelled to keep up the applications for a long period, though it is not the rapidity but the permanence of the cure which should be our aim. Even when gonococci disappear in twenty-four to forty-eight hours the patient should be instructed to continue the prolonged injections once daily for a week.

Microscopic control must be continued throughout, and only after repeatedly negative microscopic findings is the treatment to be abandoned. The physician should be slow in discontinuing his treatment.

In the beginning one-fourth-per-cent. solution should be employed. This should be increased in strength until one-per-cent. concentration is reached. In chronic cases the penetrating effect of protargol is well demonstrated, but it will be usually necessary before cure is accomplished to produce an acute inflammation, preferably by means of argentamin injections from 1:4000 to 1:2000.

As a result of his experience in hospital and private practise Neisser states that he has never had from any other drug such rapid, satisfactory and sure cures.

Goldenberg contributes an article which in the main confirms the favorable opinion of protargol expressed by Neisser. He states that the treatment is absolutely painless and there is no evidence of local irritation. In some cases after the disappearance of the gonococci a slight discharge persisted, which subsided after the conjoined use of astringent injections.

Reports on Therapeutic Progress

CALOMEL AND ACIDS.

Ever since calomel was introduced into therapeutics classic authors have drawn attention to the minute precautions that its use requires if one wishes to avoid serious results. It is well known that this substance

is unstable. Chemistry teaches that it is easily decomposed upon contact with salts and acids, and is transformed into corrosive sublimate. There are authors who will not admit the truth of this idea. They hold that the cases of poisoning observed are due to idiosyncrasies; others assure us that they have never found sublimate in the digestive tract; others again have the theory of intoxication, and think that the accidents arise from a reaction between calomel and albumen. The dangers that this drug present cannot be contested, as the experiments of Ottolenghi prove. This author has given calomel in therapeutical doses to dogs and compelled them to drink salts and acids. The animals always presented symptoms of intoxication, which appeared with more rapidity and severity than if the calomel had been taken alone. In these experiments the symptoms were not the same as those observed after the ingestion of corrosive sublimate. Ottolenghi affirms that, contrary to the current opinion, calomel is not decomposed in the stomach; in fact, if we place calomel in solutions of salts or acids, no phenomenon will appear if the temperature is no higher than that of the body, 37°C. That which does not take place in the laboratory does not take place in the stomach in those cases to which we refer. The exaggeration of the toxic effect of calomel after the ingestion of salts or acids arises from the fact that its combination with albuminoid substances contained in the stomach will be facilitated and will yield products much more soluble, so that calomel, which is normally absorbed in very small quantities, will pass in much larger amounts into the circulation, thus provoking signs of grave intoxication. — *Medical Record*, Oct. 30, 1897.

THE SYMPTOMATIC TREATMENT OF EXOPHTHALMIC GOITRE.

The *Journal des Praticiens* of October 16, 1897, contains an article upon this subject by Deguy. The most important symptomatic signs to be combated are the cardiac disturbances, which are usually manifested in symptoms of feebleness of this organ. In some of these cases digitalis is a valuable drug, in other cases it fails to do good. It is particularly indicated, according to Huchard, in those instances in which the heart is greatly disturbed in its rhythm and power. In these cases the digitalis exercises a valuable sedative effect and should be given in small doses. The murmurs which are heard in the heart in many cases of exophthalmic goitre are not to be regarded as valvular affections, but as temporary symptoms of the disease. For the palpitations, which are annoying symptoms, Ging has recommended the application of cold compresses to the præcordium, or in their place atomization by ether or chloride of ethyl or the use of an ice-bag. All of these applications are practically without danger. Care, however, must be taken that they are not so continued as to destroy the integrity of the skin. In some cases strophanthus is better than digitalis. In those instances where there is considerable cardiac pain or pseudo-angina, nitroglycerin is useful. Counter-irritation produced by chloroform compresses is of value. Aconite is also useful in some instances. If albuminuria is present a milk diet should be insisted upon.

Dieulafoy has strongly recommended the following prescription in cases of great erythrism of the cardio-vascular apparatus:

℞ Powdered ipecac, ½ grain;
Extract of opium, 1-10 grain;
Powdered digitalis, ¼ grain.

Make into one pill and give four to six in twenty-four hours.

On the other hand, tincture of veratrum viride, ten drops a day increased to twenty drops progressively, has been recommended by Sée as a valuable remedy, and small quantities of veratrine ointment may be applied over the præcordium with advantage. Another line of treatment is that of Handfield Jones, which, however, is rejected by the author of this paper, namely, the administration of strychnine. Ergot has given good results in some of Huchard's cases, particularly when combined with the hydrobromate of quinine as follows:

℞ Hydrobromate of quinine,
Ergot, of each ½ drachm.

Make into four pills; give three to six a day.

The best hypnotics for the insomnia are chloral and trional. Arsenic may be given for the general improvement of the patient's nutrition.

THE USE OF VINEGAR FOR THE VOMITING PRODUCED BY CHLOROFORM.

La Médecine Moderne quotes the observation of Lewin that out of 174 cases of vomiting following the administration of chloroform he was able to relieve 125 patients by causing them to inhale the fumes of vinegar, the vinegar having previously been placed upon a towel. The method consists in placing a

small piece of linen which has been wet with vinegar over the face of the patient for a number of hours, after the chloroform mask has been removed. If the vomiting returns after this treatment is stopped a renewal of it will be sufficient to check the relapse.

Lewin believes that in the elimination of chloroform from the lung it is decomposed into hydrochloric acid and chlorine and that these irritating substances are responsible for the attack of vomiting, and that the inhalation of the vapor of the vinegar produces trichloracetic acid, which does not produce vomiting.

LACTIC ACID IN A CASE OF ARTHRITIS DEFORMANS.

ZOLOTAVINE (*La Médecine Moderne*, Sept. 18, 1897) used lactic acid with success in an old case of arthritis deformans, administering daily ten drops of this drug upon an empty stomach, and allowing no food for an hour and a half afterward. The disease had lasted for ten years, and for a year the patient had not been able to leave her bed. The dose of the medicine was gradually increased to forty drops daily. At the end of three weeks the action of the acid was manifest; the articular pains were so relieved that the woman was able to get out of bed and walk a little; the circumference of the joints diminished slightly; nutrition improved and abdominal pains disappeared. No other medicine was used, and the only external treatment was a light massage. Improvement continued until the patient, at the time of writing, could walk without a cane and attend to her ordinary occupations.—*Medical News*, Oct. 30, 1897.

THE TREATMENT OF UREMIA.

In the *Journal des Praticiens* LE GENDRE recommends the following treatment: In eclamptic accidents we should use inhalations of chloroform and administer chloral and the bromides by injection. The suggestion that antipyrin be employed is not to be carried out, as this substance seems to decrease the urinary secretion. Some practitioners have resorted to compression of the carotid and others have employed hot baths. For the coma of uremia subcutaneous injections of caffeine and ether with inhalations of oxygen are to be employed. The dyspnea is to be combated in different ways, according to its cause. Should it be due to acute edema of the lung multiple scarifications and cuttings of the thorax may be resorted to, oxygen given by inhalation, and the nitrite of amyl or nitroglycerin is to be administered. Sometimes this form of dyspnea is relieved by the injection of morphine. In the chronic dyspnea of uremia with nightly paroxysms bleeding is not indicated, but morphine is often a useful drug. Should the dyspnea depend upon nervousness of the heart cardiac tonics such as digitalis are valuable. On the other hand, should the dyspnea be mechanical in the sense that it results from hydropericardium or hydrothorax, these cavities must be tapped and the fluid withdrawn, or the condition combated by the use of diuretics.

In regard to the incoercible vomiting small pieces of ice, sips of seltzer water or frozen champagne, one or two drops of creosote or of the tincture of iodine in a spoonful of water may be useful, and oxygen water, chloroform water, or small doses of lactic acid or copious draughts of hot drinks may be used. In other instances lavage of the stomach is of value, particularly if the vomited material is ammoniacal, showing the elimination of urea into this viscus. In this condition Frerichs has recommended the use of chlorine water or benzoic acid. Should violent diarrhea exert itself it is to be controlled by large doses of bismuth, chalk, lactic acid, and nitrate of silver in pills.

THE TREATMENT OF APHTHOUS STOMATITIS.

The local treatment consists in the application to the mouth five or six times a day of any one of the following solutions:

℞ Borax, 1 drachm;
Tincture of myrrh, 2 drachms;
Syrup of mulberry, 2 ounces.

℞ Borax, 1 drachm;
Tincture of benzoin, ½ drachm;
Distilled water, 3 drachms;
Simple syrup, 6 drachms.

℞ Phosphate of sodium, 2½ drachms;
Orange-flower water, 1 ounce;
Honey, 1½ ounces.

℞ Salicylic acid, 30 grains;
Alcohol, 3 drachms;
Glycerin, 6 drachms.

If the case is a grave one it may be wise in addition to order the following prescription for internal use:

℞ Chlorate of potassium, 15 grains;
Distilled water, 3 ounces;
Syrup of raspberry, 2½ drachms.

A teaspoonful every two hours.

—*Journal des Praticiens.*

ACCIDENTS DUE TO THE EMPLOYMENT OF ANTIPYRIN.

The *Gazette Hebdomadaire de Médecine et de Chirurgie* of September 26, 1897, contains an article on this subject in which the writer refers to a thesis by M. V. Clement which, he says, is particularly instructive. The author devotes considerable space to the nature of the accidents which follow the immoderate use of antipyrin, giving a detailed account of those pertaining to the skin, the viscera, the nervous system, and the circulation, from which the following practical conclusions are reached:

1. Antipyrin should never be prescribed for very old people, for subjects attacked with non-compensated cardiac lesions, or for those in an adynamic condition.

2. In influenza and erysipelas it should always be associated with quinine and, in convalescence, with strychnine or caffeine.

3. In arthritic subjects, who are nearly always dyspeptics, it should be associated with an alkali (sodium bicarbonate or sodium benzoate) and prescribed in solution. If it cannot be taken except in a capsule, the patient should drink a quarter or half a glass of Vichy immediately after taking the capsule.

4. In tuberculous subjects twelve grains at a time should not be exceeded, and the condition of defervescence should be carefully watched. It is well in these cases to combine alcohol and antipyrin and give the latter in solution.

5. In diabetic subjects the association with alkalies is obligatory.

6. In children antipyrin may be administered without inconvenience even in amounts proportionately larger than in adults, provided it is given in divided doses. This tolerance depends as much upon the integrity of the renal functions as upon the mode of administration, which should nearly always be by the solution.

The writer calls attention to the fact that antipyrin given in powder, sometimes even in solution, has a special effect upon the mucous membrane of the stomach, and that this may be avoided by employing hypodermic injections. An injection done aseptically never gives place even to the least cutaneous disturbance.

The treatment of these accidents consists, naturally, in suspending the use of the drug. For the cutaneous accidents simple measures are generally sufficient. If it is a serious case of poisoning, injections of ether and especially of caffeine should be resorted to. During convalescence alcohol, digitalis, strychnine, and small doses of quinine render great service.—*New York Medical Journal*, Oct. 30, 1897.

THE THERAPEUTIC EFFECT OF ARTIFICIAL HYPEREMIA.

BIER (*Münchener Medicinische Wochenschrift*, 1897, No. 32), who for some years has advocated artificial hyperemia as a successful method of treating tuberculous joints, has tried its effect in other diseases. Syphilitic foci of disease invariably were affected for the worse, and the growth of two sarcomata was rapidly increased. In gonorrheal articular rheumatism artificial hyperemia was almost always of marked benefit, but in acute articular rheumatism the results were variable. In chronic rheumatism and arthritis deformans the results were unequal, but generally very good.—*British Medical Journal*, Oct. 23, 1897.

THE USE OF CALOMEL INJECTIONS IN LUPUS.

In *La Presse Médicale Belge*, HASSELBERG records his experience in the treatment of lupus with calomel injections in four cases, and he believes that this method of treatment is destined to produce great results in the treatment of this troublesome cutaneous affection. The number of injections usually vary from three to twenty-five or thirty, but unfortunately no statement is made in the article as to the quantity of calomel injected at each dose; neither is there any definite statement as to the part of the body in which the injection was made.

The method of treatment is recommended in those cases which will not submit to or are not suitable for surgical interference.

THE TREATMENT OF HEMOPHILIA WITH CHLORIDE OF CALCIUM.

Physiologists have known for some time that lime salts play an essential part in the coagulation of the blood. This suggested to Dr. A. E. Wright the possibility of artificially increasing the power of coagulation. He made some valuable researches and showed that the administration of chloride of calcium caused a considerable increase. He found that in hemophilia the coagulation time could be reduced about one-half. He therefore suggested the use of this salt in the treat-

ment of hemophilia and other diseases attended with recurrent hemorrhages. His conclusions have been fully confirmed by the results, especially in the case of hemophilia, where they are even brilliant. But the value of the treatment appears still to be but little recognized. The following case, published by Dr. Clifford Perry, and abstracted in a recent number of the *Revue des Sciences Médicales*, is very definite evidence: Severe hemorrhage followed incision of a dental abscess in a case of hemophilia. Only after four hours' energetic work, and packing the whole space between the alveolar process and the cheek with gauze saturated with strong solution of perchloride of iron, did the hemorrhage cease. Later epistaxis and recurrence of hemorrhage from the wound took place, which ceased when the patient was on the verge of collapse. After six hours alarming hemorrhage again occurred, which all ordinary means failed to stop. Chloride of calcium was given in doses of two grains every four hours. In a few hours the effect was marked; a firm clot formed and the hemorrhage ceased.

THE TREATMENT OF LEG ULCERS.

The following treatment is suggested by the *Journal des Praticiens* of July 3, 1897: After rendering the surface of the ulcer antiseptic it is cauterized with nitrate of silver, followed by the application of boric acid. If this does not produce improvement the following ointment is applied daily:

℞ Carbolic acid, 30 minims;
Boric acid, 2½ drachms;
Powdered camphor, 2 drachms;
Ichthyol, 5 drachms;
Oil of sweet almonds, 2 drachms;
Zinc ointment, 3 ounces.

THE EFFECTS OF RESISTANCE EXERCISE UPON THE CIRCULATION IN MAN, LOCAL AND GENERAL.

In the *British Medical Journal* of October 16, 1897, BRUNTON and TUNNICLIFFE record a study of the effects of resistance exercise. The conclusions which they are able to formulate from their experiments fall under two heads: (1) Physiological; (2) Medical.

1. Physiological: (*a*) Locally, gentle exercise is followed by a dilatation of the muscular arterioles with an increased flow of blood through them. This is shown by the fact that after the contraction is over the pulsations in the muscle have a greater amplitude—that is, there is a greater distance between the crest and hollow of each pulse wave than before the contraction. As these alterations in the circulation are purely local, the heart remaining the same, they can only be due to a local dilatation of the arterioles in the muscle, allowing them to empty themselves more rapidly during the cardiac diastole. (*b*) Generally, the effect of exercise so gentle as to cause no hurry in the respiration and no increased frequency in the pulse on the general blood-pressure is that during the exercise itself the pressure first rises above the normal, but begins to fall, even during the continuance of the exercise; continues to fall, so that at the end of the exercise it has usually reached the normal. After cessation of the exercise the pressure continues to fall. The pressure after the exercise may remain subnormal for half an hour or longer; after the expiration of this time it gradually rises again to its initial height.

These results may at first sight appear to differ from those of Oertel, who found that a rise in general blood-pressure invariably followed muscular exercise. The authors believe that the difference between his results and theirs depends upon the amount of exercise taken being different in the two cases. In his experiments the amount of exercise was sufficiently great to cause considerable strain. In one case, for example, the exercise consisted in making an ascent in forty minutes for which an hour was usually reckoned. Although he notes that no difficulty in breathing occurred, yet the respiration must certainly have been quickened.

If we compare the results of the author's experiments just mentioned with those which Brunton and Tunnicliffe found to follow massage, we notice that the primary rise of blood-pressure upon exertion is greater than that caused by massage, but that the subsequent fall is both greater and of longer duration.

2. General medical conclusions: (*a*) In cases where the heart is very feeble, so that the primary rise of blood-pressure caused by even gentle exercise may interfere with its action, massage is the mode of treatment best adapted for restoring the circulation. (*b*) That when the heart is sufficiently strong to bear the increased resistance presented to it by the primary rise of pressure occurring during exercise, gentle exercise is preferable to massage, inasmuch as the subsequent diminution of resistance is greater in amount and of longer duration. (*c*) The difference between their results and those of Oertel

affords a scientific basis for the practical rule which has been found so advantageous at Nauheim, namely, that the exercises shall not be carried to such an extent as to cause any acceleration of breathing on the part of the patient.

THE PREVENTION OF IODOFORM INTOXICATION.

SASSE is quoted by *Journal des Praticiens* of October 16, 1897, as recommending the following means of demonstrating in time a threatened iodoform intoxication, a condition which is not rare in surgical and gynecological practise. A test is made of the urine to note the quantity of iodine which is eliminated by it. A small pinch of powdered calomel is placed upon a saucer, and then a few drops of the urine to be examined is dropped upon it; a mixture of the urine and calomel is then made with a glass rod. If the urine contains a notable amount of iodine there is produced a well marked yellow discoloration, which should indicate that the iodoform is being absorbed in sufficient quantity to produce danger.

ADMINISTRATION OF ANESTHETICS THROUGH A TRACHEAL WOUND.

In the London *Lancet* of November 6, 1897, THOMAS ANNANDALE recalls the fact that in March, 1897, he published in the *Edinburgh Medical Journal* a short paper upon "Preliminary Tracheotomy as an Aid to Certain Operations" In this communication the writer has described and figured a simple appliance for keeping a patient under the influence of chloroform or ether in connection with operations which necessitated a previous tracheotomy. Since then he has used this appliance from time to time with success, but having found that the india-rubber tube connected to the tracheotomy tube was sometimes apt to get twisted at its point of connection and so interfere with respiration, and also that matters coughed up were not readily expelled through the long tube, he has had his apparatus improved so as to lessen these risks. This modified appliance was recently employed with perfect success in a case of excision of the entire larynx and portion of the trachea, together with a large and vascular thyroid tumor, the patient being now quite convalescent.

This improved apparatus is as follows: (1) An ordinary full-sized silver tracheotomy tube having its upper end extended for about half an inch beyond the shield. (2) A silver cap, having a short tube of the same metal projecting at right angles from it and to which one end of an india-rubber tube is connected. The cap fits easily on the tracheotomy tube and is also turned around so as to allow the attached india-rubber tube to project on either side, whichever may be found most convenient for the administration of the anesthetic. (3) A portion of the india-rubber tubing; the length of this should be about two feet, but it may be used shorter or even a little longer. The diameter the author prefers is about half an inch. (4) An ordinary glass tumbler or other similar receptacle with a small piece of lint or absorbent wool placed at the bottom, upon which the chloroform or ether is from time to time sprinkled.

The writer prefers chloroform, but whatever anesthetic is used may in the first instance be held over the tracheotomy tube with the cap off, and when the time for the operation has come the cap with attached india-rubber tube is put on and the anesthetic inhaled from the tumbler, the anesthetist standing or, if he prefers, sitting well away from the operating table, holding the tumbler in one hand. For preventing saliva, blood or vomited matters passing into the air-passages during the operation the introduction of a piece of sponge or other plug into the trachea above the tracheotomy wound is usually satisfactory, but in the case of the excision of the entire larynx already referred to he has adopted a thoroughly effective and as far as he knows original method, and he is inclined to think that this plan may be used in other cases. The procedure was to pass round the trachea immediately above the tracheotomy wound an india-rubber cord and by means of it to ligature the canal temporarily so as completely to prevent the entrance of any fluids or other matters into the air-passages. When the ligature was removed at the completion of the operation above referred to, the walls of the trachea did not appear to have been injured by it. It is true that the condition of the tracheal rings in some instances might prevent such a ligature being perfectly effectual, but the writer is of opinion that this means of temporarily closing the trachea is worthy of consideration and trial.

The advantages, then, claimed for the appliance which the author speaks of are: (1) It is simple and at the same time effectual. (2) The cap being movable can if necessary

be at once disconnected from the tracheotomy tube, so as to allow mucus or other matters to be more easily expelled from the air-passages; this mobility also allows the cap and connected india-rubber tube to be turned round to either side. (3) It allows the anesthetic to be administered at some distance from the patient, and so does not interfere with the operative procedure. (4) The anesthetic when inhaled through the long tube is not likely to be so irritating to the air-passages as when it is more directly inhaled through the tracheotomy tube itself.

THE PREPARATION OF DIPHTHERIA ANTITOXIN.

A. T. Bazin, in an article on the preparation of diphtheria antitoxin in the *British Medical Journal* of December 11, 1897, speaks of its use in treatment and thinks that he ought, while considering the effect of antitoxin on the local lesion, to refer to the employment of local treatment. The writer thinks it wise to condemn the practise of entirely withholding local treatment and trusting all to the antitoxin. It is simply a plan of counteracting the ravages of the Klebs-Loeffler bacillus, and trusting to a kind providence that streptococci and other pus organisms will not be absorbed from a highly absorptive surface in a state of impaired vitality. The course is not rational; as well treat a case of tertiary syphilitic ulceration with potassium iodide and neglect to cleanse the ulcers and treat the surrounding cellulitis. On the other hand, too rigorous local treatment is to be deplored. It smacks of the days of pepper, sulphur, lactic acid, and strong hydrogen peroxide. A median course which supplies a gently cleansing solution to the inflamed part is one to be recommended.

The depression so marked in diphtheria is replaced in one or two days by a feeling of well-being which is surprising. This is a most certain index of the effectiveness of the dose. Antitoxin also prevents the anemia so constantly caused by diphtheria, both by antagonizing this effect of the toxin and by shortening the disease. Convalescence is, therefore, very rapid.

The effect on the temperature is twofold: first, there is a reactionary rise of 0.5° to 3° F., followed in from four to six hours by a drop to or almost to normal, and, if the dose has been sufficiently large, a normal course thereafter. This condition is not constant, but is the common one. If the dose has not been sufficient, the temperature will evince a tendency to rise to or above the level existing previous to the administration of the antitoxin.

The effect on the pulse is irregular. To a large extent the pulse, in rate and volume, responds to variations in the temperature. After twelve hours have elapsed from the time of injection a sudden change in cardiac action could hardly be attributed to the antitoxin.

The dosage followed by the author is that advocated by the American Pediatric Society: In cases of ordinary severity, children under one year 500 units; older children and adults, 1000 to 2000 units. In cases of increased severity, including laryngeal cases—and the author wishes to emphasize, nasal diphtheria—children under one year 1000 to 1500 units; older children and adults, 2000 to 3000 units.

If the lapse of eight to twelve hours have not brought about an amelioration of the symptoms, these doses should be repeated, and, if necessary, a third dose should be administered after a similar interval. It is better to be sure than sorry and therefore to err on the right side. With the use of concentrated serum where the effect is so rapidly seen and judged of, the same results may be obtained with somewhat smaller doses. But the physician must constantly be on the watch for apparently mild cases which are deceptive, and in these cases to administer the antitoxin with lavish hand. The importance of the early administration of the remedy cannot be too greatly emphasized; as the serum is innocuous it is not necessary—more, it is foolhardy—to wait for a bacteriological confirmation of the diagnosis. Clinical diagnosis, even "clinical suspicion," to coin a term, is sufficient to warrant the injection of the serum, and then let the bacteriological examination be made rather to confirm the degree as to the necessity of continued isolation of the patient, and the immunization of those exposed.

There is a further use of antitoxic serum which the author alludes to, and one which is too often neglected at the present time—that of immunization of persons exposed to the contagion of diphtheria. The happy results obtained in hospitals and institutions for the care of children sufficiently recommend the procedure. To Dr. Hermann Biggs is especially due the credit of pursuing and investigating this branch of the antitoxin treatment, and in his article which appeared

in the *Medical News* of November 30, 1893, he points out that 50 to 300 units, dependent upon the size of the patient, should be given, and that the immunity thus conferred continues to be effective for a minimum period of thirty days.

Even to children suffering from other maladies, both acute and chronic, the immunizing dose is harmless, as in December, 1896, Bazin immunized nineteen children in a ward of the Montreal General Hospital and not a single disturbance of temperature or general condition could be detected. The contagion was conveyed to the ward by a case of conjunctival diphtheria and one other child became infected. On the following day all the inmates of the ward received an injection of antitoxin and no further cases developed.

THE ACTION OF THE ALKALOIDS OF OPIUM UPON PERISTALTIC MOTION.

After a careful review and discussion of the results obtained by other investigators V. Vamossy (*Rev. de Thérap.*, Aug. 15, 1897) describes in detail the method which he employed in arriving at the following conclusions in regard to the question: What is the cause which gives to opium a greater inhibitory action on the peristaltic motion of the intestines than morphine?

1. Morphine injected in the venous circulation has the power by its centric action to hinder the action transmitted by the pneumogastric to the centers, that its centripetal action is not transmitted by the centrifugal route to the intestine and does not provoke contractions.

2. Local injections of morphine into the intestines showed that the excitability and conductivity of the nervous system of the intestine undergoes a considerable diminution as the result of the local irritation.

3. The excitations which pass by the centrifugal motor channels to reach the intestinal wall encounter the terminal nerve fibers and ganglions in a state of narcosis.

4. Narcotine acts but slightly as an inhibitor of reflex excitability in the intestinal wall, and possesses no inhibitory action upon peristalsis.

5. Papaverine resembles morphine more closely in its action upon peristalsis, but its action is too unstable.

6. Thebaïne augments intestinal excitability and provokes in consequence an intense peristalsis.

7. It can be no longer held that narceine acts in opium as an augmenter of inhibition to peristalsis in a manner similar to morphine.

8. Codeine exaggerates the intestinal excitability.

9. Cryptopinine and laudanine also act as augmenters of intestinal excitability.

As the result of his study the author concludes that opium does not owe its favorable influence upon the intestine to the presence of the accessory alkaloids which it contains.

MANGANESE BINOXIDE.

In the *Georgia Journal of Medicine and Surgery* for January, 1898, A. H. Smith tells us that, in his opinion, among medicines having a specific action there is none which has given him more satisfaction than the binoxide of manganese. For many years he has prescribed it constantly for functional derangements of the uterus, and with a smaller percentage of failures than from any other drug with which he is acquainted. It has been equally serviceable when the menses were too profuse and when they were too scanty; when the interval between the periods was too short, and when it was too long. In this respect there is no other term that describes its action as the word "corrective." In the absence of organic disease it seems to have the power, in a great many cases, of bringing the menstrual function back to the normal standard in whatever direction the deviation from that standard may have been. Again and again the writer has seen an habitual interval of three weeks lengthened to the normal twenty-eight days, or a usual duration of eight days, for example, reduced to four or five. On the other hand, irregular or abnormally long intervals have been brought to regular four-weekly periods, and a scanty flow to a satisfactory quantity.

In painful menstruation not dependent upon anatomical conditions the writer has come to rely with great confidence upon the relief to be obtained from the binoxide. Beginning about four days before the expected period, and continuing until the flow is fully established, it will generally give a measure of relief for that time. It may, however, seem to be of little or no benefit on the first occasion, but if repeated for the next month an amelioration may be quite confidently predicted, and by perseverance during three or four periods complete and permanent relief is usually obtained.

The headache of a burning character, and limited to the vertex, which so frequently has a uterine origin, is often promptly relieved by two or three doses of the drug, administered at intervals of two or three hours, and this even when it occurs during the intervals of menstruation.

Finally, in the only instance in which he has employed the binoxide for this purpose it gives decided relief to the hot flashes attending the menopause. If the patient takes a pill of two grains at bedtime, she passes a fairly comfortable night, whereas if the pill is omitted she wakes half a dozen times to find herself dripping with perspiration. The author has heretofore depended upon one of the nitrites in such cases, but there are persons who cannot bear them even in the smallest doses, and in such cases he intends to make trial of the manganese.

The author's experience with the drug convinces him that it controls in a marked degree the nervous disturbance emanating from the uterus. The effect is often too prompt to be attributable to a merely tonic action upon the general system, and he is forced to believe that it has a peculiar specific relation to the parts involved.

The dose is two grains three times a day, but as it is absolutely without unpleasant effects, it may be given in much larger quantity and at much shorter intervals. For its effect upon the periods it should be given for three or four days before the expected time and continued nearly or quite through the period, this being repeated for several consecutive months.

INTRAVENOUS INJECTIONS OF ARSENIC IN THE TREATMENT OF PSORIASIS.

HERXHEIMER (*La Semaine Médicale*, clxii, 1897) has employed these injections in twenty-eight cases, in twenty-five of which no other treatment was adopted. Of these twenty-five, ten were completely cured, six left the hospital much relieved, and nine were reported as still under treatment, all greatly improved, and three nearly cured. The commencing dose is one milligramme of arsenous acid, and this is increased daily by one milligramme up to fifteen milligrammes, the maximum dose, which is repeated daily till the eruption disappears, generally at the end of six or seven weeks. At the end of the first or beginning of the second week the patches become darker in color, and there is a more abundant production of scales; the eruption then fades and disappears, the pigmentation occasionally persisting. The injections are generally well supported. Arsenical zona and diarrhea were met with in a fortnight in two cases, and a venous thrombosis, cured in a fortnight by rest of the affected limb, occurred in a third; slight thrombosis also occurred in another case.

The following is the method of procedure: After disinfection of the skin by soap, turpentine, ether, and sublimate, and the application of an Esmarch bandage above the elbow to render the veins prominent, the needle of a Pravaz syringe is introduced as nearly parallel to the skin as possible, and its penetration of the vein ascertained by withdrawing the piston. After the injection of one cubic centimeter of a limpid solution of arsenic of the desired strength, the wound is closed with oxide of zinc plaster. – *British Medical Journal*, Oct. 23, 1897.

THE DANGERS OF ARTIFICIAL RESPIRATION.

A. BROSCH (*Deutsche Archiv für Klinische Medicin*, vol. lviii, p. 605) narrates that a man, aged twenty-two, fourteen days after his discharge from the hospital as convalescent from diphtheria, was seen to get up suddenly from the dinner table, take a few steps towards the door, and fall down. The doctor was called and found the man apparently dead; he nevertheless tried artificial respiration for a long time, but in vain. At the necropsy food was found in the trachea and bronchi, and the uvula and soft palate were edematous.

Was the entry of food into the air-passages during life the cause of death, or was death due to syncope? And did artificial respiration after death cause the entry of some of the gastric contents into the air-passages? To throw light on this question Brosch made a number of experiments on dead bodies. He opened the stomach, put fluid into it, closed up the opening again, and ligatured the pylorus; artificial respiration—Sylvester's method—was found to cause the aspiration of some of the gastric contents into the air-passages. In a control experiment he did not open the stomach, but contented himself with trying the effect of artificial respiration on the natural stomach contents. A similar result was quickly obtained, and the fluid contents of the stomach immediately began to fill the pharynx, flow out of the mouth, and enter the air-passages; the fluid

food was found in the trachea, main bronchi, and all the branches of the main bronchi.

Brosch discusses various methods—preliminary tracheotomy, artificial respiration after the manner of Schüller, Howard, and Marshall Hall—and comes to the conclusion that when there is reason to fear aspiration of gastric contents, the best way to avoid the possible fatal effects of artificial respiration is, before commencing the movements, to introduce an elastic tube into the esophagus. This he thinks will likewise help to prevent the falling back of the tongue. The tube should, however, be sufficiently stiff to avoid its being quite easily pressed flat, in which case its lumen would be obliterated and it would be rendered useless. It should also reach at least fifteen centimeters beyond the pharynx into the esophagus, and ten centimeters of the tube should project from the mouth and the outside end should be weighted down, so that, if any fluid comes out, it will not flow back into the pharynx again.—*British Medical Journal*, Oct. 23, 1897.

THE TREATMENT OF THE PUERPERIUM

In the *British Medical Journal* of October 23, 1897, Dr. A. H. WRIGHT gives us a view of the methods and results reached in the lying-in wards of the Toronto General Hospital. He tells us that before vaginal examinations the hands are washed for four minutes in hot water, using soap and a nail-brush; the nails are cleaned with a penknife; and then the hands are washed for two minutes in hot bichloride solution (1 to 2000), using a nail-brush again. The hands are then immersed in hot bichloride solution 1 to 1000 immediately before making an examination; and carbolized vaselin is used for a lubricant when required (generally not used). They use an ordinary minute-glass, such as is found in a kitchen for cooking eggs, to govern the time the hands are cleaned. The glass is attached to the wall near the delivery bed. It is reversible and takes six minutes to empty from one side to the other. There are on the glass notches to indicate three and four minutes. At the same time the accoucheur takes off his ordinary coat and puts on a clean white apron. The best apron is one that goes around the body, with sleeves which go to the elbows. Both hands and forearms are bare.

The instruments, forceps, etc., are kept in a boiling solution of carbonate of sodium one-per-cent. for ten minutes before and after they are used. Glass or rubber catheters are employed, and half a pint of a solution of carbonate of soda is passed through the catheter after it is used, and it is then placed in a bichloride solution, 1:1000.

After labor the vulva is washed with a warm soda solution, then with a bichloride solution, then a powder composed of boric acid and acetanilid is freely applied, and then the vulva is covered with a thin layer of absorbent cotton which has been taken from a bichloride solution. Over this is placed a sterilized absorbent pad.

The patient is prepared for the delivery table by the matron or nurse in accordance with fixed rules, which however are not printed. During labor the vulva is covered with a bichloride pad.

The printed rules and the homely cooking minute-glass were not popular at first. The resident assistants sometimes ignored them or obeyed the directions in a half-hearted way. The two years from 1891 to 1893 were a transitional period during which the rules did little or no good. The results were certainly discouraging, as a death from septicemia occurred in each of these years. Since November, 1893, their results have been better, as they had 500 deliveries without a death from any cause. Excepting in two cases, to which the writer refers again, the patients have gone out well, so far as they can be at that time. In no single instance since November, 1893, has a patient, transferred to another part of the hospital, died from pneumonia or any such disease. It happens that most of those women who died during the nine years were transferred to the General Hospital during illness, but these deaths are included in this record.

Before giving any further particulars as to mortality or morbidity the writer refers to certain details relating to matters which have given much anxious thought. In his private practise he has not used the vaginal douche either before during or after labor as routine practise for fifteen years. When he first commenced work at the hospital eleven years ago, he found certain members of the staff using the vaginal or uterine douche to a considerable extent. This has gradually become less common, until it has almost gone out of fashion. For some time a vaginal douche was given immediately before and after labor, and an intra-uterine douche was given when the temperature went up. During the last two years no douche has been given either before or after labor unless there

seemed to be some special indication for it. When there is evidence of a foul condition of the interior of the uterus causing sapremia, or something worse, the intra-uterine douche is sometimes used. The "rinsing" curette with the douche is employed occasionally. His own preference is to have the patient anesthetized, introduce his hand into the vagina, clean out the interior of the uterus with his finger-tips, and then wash out with a one-per-cent. solution of creolin.

The use of the forceps is discouraged. No resident assistant is allowed to apply the forceps without permission of the medical superintendent or a member of the visiting staff. They have a forceps delivery about once in twenty cases. The patient is generally placed on her back and delivery accomplished by the resident assistant. The forceps used is either the Elliott or the Simpson axis traction. Chloroform or ether is sometimes administered.

Catheterization is considered an evil. The nurse is expected to get along without it. They want no catheter epidemics. They have had no cases of cystitis due to the use of the catheter in 1250 cases recorded. The catheter is used about once in fifty cases (not including catheterizing before operative procedures or in cases of eclampsia). The bedpan is in certain cases placed under the patient and left there for some time, the nurse going to another part of the ward. It frequently happens that the patient is unable to micturate while the nurse is watching her, but does so after she is left alone. The last resource is to administer a copious enema, after which the urine generally comes while the bowels are being evacuated.

The placenta is generally expressed by the modified Crédé, or what is commonly known in Canada as the Dublin, method. The uterus is watched for fifteen minutes with the left hand over the fundus. Efforts are then made to squeeze the placenta out by grasping the fundus with thumb and fingers of one hand, or sometimes with two hands. This can generally be better accomplished with the patient on her back. If the placenta cannot be expelled in thirty to forty-five minutes, the hand is introduced into the vagina or uterus and the placenta is extracted. The operator is again expected to thoroughly cleanse his hand before such introduction. In the cases under his care a douche is not administered after such procedure unless some bad symptoms appear.

In the whole number of cases reported only one instance of mastitis with suppuration occurred; and in this patient it was thought that mastitis existed before labor. The nipples are carefully watched, and if they become sore are washed after the child nurses with a carbolic solution 1 to 40, after which the following is applied, as recommended first by Hirst, of Philadelphia: Castor oil and bismuth subnitrate, equal parts. If the breasts become uncomfortable or painful from distention a binder is carefully applied. They use what is generally known in New York as the "Murphy binder," or the Snively modification of the same. They are now introducing the Y-bandage (Boston Lying-in Hospital), which has been very satisfactory to the writer in private practise in certain cases. Where they wish to prevent the secretion of milk—as, for instance, when the babe is still-born—they depend entirely on the Murphy binder, which is applied rather tightly, generally the day following labor.

Morphine administered hypodermically subdues most quickly the excitability of the nerve centers in convulsions.

Chloral hydrate is the best remedy to prevent recurrence of convulsions after they are to some extent brought under control. It is also sometimes useful as a preventive remedy when the symptoms of toxemia are severe and convulsive seizures are feared, but have not yet appeared. Wright sometimes combines the two remedies for severe convulsions, giving the morphine hypodermically and the chloral by enema. Chloroform sometimes has a good effect on the convulsions, but its administration has frequently disappointed him. There is no doubt that bleeding in properly selected cases has a good effect. We neglect it too much in these modern days. The writer has had but little experience with veratrum viride, and where he has seen it administered has not been favorably impressed with the results. He only mentions pilocarpine to give it an unqualified condemnation, as he considers it both uncertain and dangerous.

The author has not space to discuss the important subject of the induction of abortion or premature labor. He objects strongly to the former (except in extreme cases), and he does not hurriedly resort to the latter. In the 500 patients to which he has specially referred there were twenty-one cases of toxemia, with five of eclampsia. They induced premature labor twice, and assisted labor by digital dilatation of the cervix and the use of forceps in three instances.

THE TREATMENT OF TUBERCULAR PERITONITIS BY ENEMATA OF COD-LIVER OIL WITH CREOSOTE.

The great favor in which creosote is now held in the treatment of tuberculous conditions induced THOMAS (*Rev. Méd. de la Suisse Romande*, NOV. 28, 1897) to employ it in enemata of cod-liver oil in the treatment of the peritoneal form of this disease. The results which he has obtained, both in the disappearance of local symptoms and the general improvement in the health of the patient, are very satisfactory and would lead him to believe that a further study of this method, both experimentally and chemically, would be of great benefit.

The treatment consisted in the daily evening employment of an enema made up of an emulsion of 100 grammes of cod-liver oil containing one-half to two grammes (eight to thirty grains) of creosote, according to the age of the patient, with the addition of a few drops of laudanum to produce tolerance.

If the intestine has been previously suitably cleansed, there is no difficulty in retaining the enema, which is for the most part absorbed by the intestine, the amount discharged the following morning decreasing gradually as the treatment progresses.

SEVERE SYPHILIS TREATED BY THE METALLIC IODINE.

BOUVEYRON (*Lyon Médical*, No. 2, 1898) points out that iodine does not receive the recognition which its merits justify, due to the fact that it has not been used in sufficient doses and that the prescriptions containing it have not been properly compounded. The excipient should not combine with the iodine, should dissolve it perfectly, should correct its caustic property and its styptic effects, and should inhibit the combination of the iodine with the contents of the alimentary canal. Each dose should be given half an hour before meals. The ideal prescriptions, he holds, are as follows:

℞ Metallic iodine, 15 grains;
Potassium iodide, q. s. ad solution.

℞ Neutral glycerin, 1½ to 3 drachms;
Citric acid, 4 drachms;
Simple syrup, 2 pints.

A teaspoonful is taken half an hour before meals, twice daily, until six teaspoonfuls a day are administered, or even twice this quantity. In thirty cases, iodism was noted in only two. In one case suffering from gummata of the legs and unable to take either iodide or mercury, the administration of iodine was followed by cicatrization in fifteen days. The second case, presenting laryngeal pulmonary and cerebral symptoms, all pronounced, persistent, malignant and progressive in spite of ordinary specific treatment, recovered promptly under the iodine. In the third case, presenting tertiaries in the most malignant form, the iodine was equally successful.

THE CURETTE AFTER ABORTION AND DELIVERY.

BÖTTNER (*Centralblatt für Gynäkologie*, No. 51, 1897) has observed twenty-eight cases where the operator was Glaevecke. He finds that the use of the curette is free from danger if carried out with proper precautions. It permanently stops hemorrhage after abortion or delivery, and as a rule the catamenia return soon, and continue normally, contrary to what is so often seen in mismanaged cases. A skilful use of the curette likewise prevents those morbid changes which are the cause of sterility.—*British Medical Journal*, Jan. 22, 1898.

THE CELLULOID BANDAGE.

The *modus operandi* of applying this bandage is as follows: Sheet celluloid is cut into small pieces and dissolved in a close-stoppered bottle in acetone, enough of the fluid being used to rise four times as high in the bottle as the celluloid. This solution of celluloid is rubbed into each layer of the gauze or crinolin bandage or jacket, an ordinary kid glove being worn for the purpose, as the celluloid otherwise dries on the skin and can only be washed off by acetone. For a jacket, at least ten layers are necessary; for a bandage, from four to six layers, according to the strength required. The outer layer is smeared with a coating of celluloid, which forms, when dry, a highly polished surface. It takes three or four hours for a celluloid bandage to dry. That is considerably longer than is the case if plaster of Paris is used. In order to permit of ventilation, small holes may be punctured in the jacket wherever necessary. Surgeons who have experimented with celluloid as a substitute for plaster of Paris in bandages report that the weight of such a bandage is less than one-fourth that of a plaster of Paris one, and less than half that of one stiffened with water glass. It is said to be not very expensive. According to Landerer, a jacket should not cost more

than $1.50, which is no real objection to its use when one considers that, if well made, it will last for months and presents the further advantage of a smooth surface readily cleansed, and that it is impervious to urine and other discharges.—*Journal of the American Medical Association*, Nov. 20, 1897.

SOME CONSIDERATIONS OF ABDOMINAL INCISIONS.

WOOLSEY (*Annals of Surgery*, January, 1898) in studying this subject emphasizes the following conclusions as among those which may be drawn from the above considerations:

1. That abdominal incisions, except those in or close to the median line, should be obliquely transverse in order to parallel the nerves (and thereby also the cleavage lines of the skin), so as to avoid partial paralysis of the muscles, weakness of the abdominal wall, and a tendency to hernia.

2. That intermuscular or even transmuscular incisions should be preferred to those in the linea alba or semilunaris, for in both the latter cases the cicatrix is less strong and more prone to hernia, and in the semilunar line the nerves are necessarily divided.

3. That in place of the median vertical incision near the inner margin of the rectus, the trap-door incision around this inner margin offers many important advantages.

THE ELECTRICAL TREATMENT OF URETHRAL STRICTURE.

DEBEDAT (*Arch. d'Elect. Med.*, November, 1897) has introduced a modification of Newman's electrical bougie for which he claims especial advantages. Instead of being wholly metallic, the new instrument is covered with ivory up to its olivary extremity, so that the current passes to the urethra through this part alone. The author uses it in such manner as to produce dilatation without the passage of a current during its introduction, and electrolysis only while in contact with the stricture in the act of withdrawal. The electrical application is thus accurately limited to a small area. Debedat reports the successful use of the bougie in a number of cases, two of which he summarizes. He concludes that electrolysis by this improved method is a truly curative procedure as regards urethral strictures, which are by it attacked alone without injury to the healthy urethra. None of the cases hitherto observed have called for further surgical treatment. In his opinion, moreover, there is a certain proportion of cases in which electrolysis is the method of election.—*British Medical Journal*, Jan. 22, 1898.

FORCED REDUCTION OF LATERAL CURVATURE OF THE SPINE.

NOBLE SMITH (*British Medical Journal*, Jan. 8, 1898), in a paper on this subject, states that the forced reduction of curvatures of the spine, a treatment which during recent months has attracted so much attention, has been chiefly directed to the correction of the deformity in caries, and (as far as this country is concerned) little notice has been taken of its application to cases of lateral curvature. Many cautious surgeons hesitate to run the risk which apparently exists when attempts are made to tear asunder inflamed and ulcerated vertebræ with the object of getting rid of the deformity in caries, but no such risk, the author thinks, appertains to manual force applied to scoliotic spines.

A young man aged seventeen was sent to the author on September 1, 1897, by Dr. W. J. Foster, of Reading. He first began to fail in health at the age of seven, and the spine subsequently gave way. At the age of thirteen he suffered from severe rheumatism. A year ago it was noticed that the right shoulder was projecting backwards. Recumbency was advised, an inefficient apparatus was applied, and the spine had been getting worse ever since. There is a family history of phthisis.

On September 7 the author applied force to the curve. The patient was placed prone upon a couch, the level part of which supported the chest, abdomen, and pelvis, the legs sloping downwards to a foot-rest. The surgeon stood over the patient and applied almost as much pressure as he could exert with his right hand upon the prominent dorsal curve, while with the left hand he supported the patient's shoulder in the contrary direction. The pressure was made downwards as well as to the patient's left, with the object of rotating the spine towards a normal position. In making this movement the ribs on the left side were seen to assume a more natural position, partly filling up the great hollow of that region. The spine was thus considerably straightened. The patient felt sharp pain at the time of pressure, but this went off in a few moments. The surgeon then applied a light apparatus to keep up the improvement produced.

On September 16 the patient reported himself as feeling much better in health, and stated that he could sleep quite comfortably in the appliance. The author again applied force in the same way as before, with the same result—that is, the spine was made distinctly straighter. The following week he again reported himself as feeling much better and stronger, and force was again applied, with a result similar to that following the former treatments.

In making these forced reductions something was heard and felt to give way, like the breaking of adhesions.

This patient was very plucky and was able to bear the operation without an anesthetic, but it is probable that the majority of patients would be more easily dealt with while under the influence of gas or ether.

In estimating the benefits likely to be derived from this method of treatment, the author has found that whatever position can be attained by apparatus can always be reckoned upon to become permanent in the course of time.

APPENDICITIS DURING AND AFTER PREGNANCY.

VINAY (*Lyon Médical*, Jan. 2, 1898) records four cases, and in all refers to thirty-two cases. The small number tends to show that pregnancy does not set up torsion of the appendix or colitis, conditions which would increase the virulence of the colon bacillus, and so induce appendicitis. In the thirty-two cases there were ten deaths, a percentage of thirty-one, which is much higher than that of Armstrong in his series of 517 cases, with a mortality of 12.8 per cent. The only complication of importance in appendicitis occurring during pregnancy is abortion, which was noted in forty per cent.; this accounts for the fact that in half the thirty-two cases the children died. This frequency of abortion is much above that seen in other infectious diseases, and is referred to the intimate vascular and lymphatic connections existing between the appendix and the uterine adnexa. Clado described an appendicular ovarian peritoneal fold as being constantly present, and considers that this carries the lymphatics from one to the other. Laforgue, however, only finds it in twenty per cent. of bodies examined. In two of Vinay's four cases the appendicitis was primary, but in the other two the appendicitis was due to the spread of infection from the uterus. In the first there was post-puerperal infection which lighted up old appendicular mischief. The appendix was resected, and the right tube and ovary appeared healthy. In the other case, a primipara with a history of membranous colitis, there was hemorrhagic metritis due to retention of placental tissue, with subsequent appendicitis. The differential diagnosis of appendicitis during pregnancy from tubal gestation on the right side is not difficult, but it is less easy to distinguish it from right salpingitis complicating pregnancy. Appendicitis during pregnancy should be treated like ordinary appendicitis.—*British Medical Journal*, Jan. 22, 1898.

ECHINOCOCCUS OF BOTH LUNGS TREATED SURGICALLY.

STEINER (*Centralblatt für Chirurgie*, No. 1, 1898) relates a successful case with very severe symptoms. The heart was much displaced to the right, and when the mouth was opened a buzzing noise was heard synchronous with the cardiac sounds. On puncture of the left side of the thorax posteriorly, fluid containing hooklets was withdrawn. A year and a half before this report Professor Israel opened over a hepatic swelling, incised a large hydatid sac, fixing its edges to the abdominal wound, and then found a second sac behind it; this was opened and the subphrenic space discovered posteriorly. The seventh and eighth left ribs were resected behind, the costal and pulmonary layers of the pleura united by a circle of sutures, and the lung laid open within the circle. A hydatid as big as a normal human bladder was removed, lung immediately filling its place. At once the buzzing noise, caused by pressure of the cyst on the pericardium, disappeared. Six weeks later there was pricking pain and dulness at the right base. On puncture hydatid fluid escaped; dyspnea followed till the patient coughed up much hydatid fluid. Later on chronic bronchopneumonia developed. On recovery it appeared that the echinococcus had atrophied and come away. The patient is now well. Professor Israel noted that the right thorax, which had been treated by nothing more radical than puncture, was somewhat diminished in capacity, whilst the left, where resection and removal of a hydatid had been so successfully undertaken, remained of normal capacity.—*British Medical Journal*, Jan. 22, 1898.

A PRELIMINARY REPORT UPON THE EXAMINATION OF THE BLADDER AND THE CATHETERIZATION OF THE URETERS IN MEN.

In the *Annals of Surgery* for January, 1898, HOWARD A. KELLY publishes the following:

When the author first succeeded in his vesical and ureteral examinations in women in the spring of 1893, he expressed a conviction that he has often restated since then, that the bladder in the male could also be investigated in a similar manner, and in all probability the ureters could be catheterized. So positive was his conviction that he had a long, straight, male cystoscope made November 18, 1893.

Much as he desired to do so, it had been impossible for him to test this instrument until quite recently, owing to the excess of his regular professional obligations always crowding him for time, as well as to the fact that such men as did come under his care were private patients, and although suffering with renal diseases in some instances, he was not at liberty to pursue any line of investigation which might justly be called experimental. He also placed an instrument more than two years ago in the hands of his colleague, of the Johns Hopkins Hospital, who used it to examine the bladder in a case through a perineal section; but the instrument was not further tested through the intact urethra owing to the fact that the Casper electric cystoscope was already established in the male genito-urinary department, and its use well understood.

The author succeeded in securing a patient and testing the method of direct examination in the male bladder, through a simple straight speculum and under atmospheric distention induced by posture, for the first time on November 20, 1897, and he owes this opportunity to the courtesy of the surgical staff of the Johns Hopkins Hospital, and particularly to Drs. Harvey W. Cushing and Hugh H. Young.

The patient, a man about forty-eight years old, had a persistent hematuria of undetermined origin. After due antiseptic precautions and washing out of the bladder, it was filled with a saline solution and then examined with the Casper cystoscope. For the most part the bladder-wall was found normal, but at the base a dark, tufted, villous area was found from which a cloud of blood kept rising and mingling with the clear medium. The conclusion was reached that this was probably a vesical papilloma.

The bladder was then emptied with a catheter and the patient placed in the knee-breast position, with the chest close down to the table, the elbows spread apart, and the thighs slightly drawn up under the abdomen. The straight cystoscope, eight millimeters in diameter, and with a tube eighteen centimeters long, with a funnel-shaped opening and a diminutive handle like those attached to his first cystoscopes used in women, was then introduced. This cystoscope, made for him in November, 1893, was inserted into the bladder by Dr. Young without difficulty, while the patient was still in the dorsal position; when he assumed the knee-breast position the obturator was drawn out and air at once entered the bladder. The author attempted to let air into the rectum in order to drop the base of the bladder down more into the plane of vision; but little went in.

The examination of the bladder was now conducted by looking into it through an ordinary head mirror, reflecting an electric light which was held close to the sacrum. The base of the bladder came perfectly into view, and the posterior walls were readily seen. The sound mucosa of the posterior wall showed the characteristic pallor, with small vessels branching out here and there over its surface. We were able to see at once that the base was simply coated with blood which had accumulated there in the most dependent position, and that there was no papilloma or other growth present. The trigone and the interureteric ligament were injected and plainly defined.

The author was enabled to see and to demonstrate the orifice of the left ureter and to introduce into it one of the metal catheters which he uses in women. While the speculum was held up against the ureter, drops of urine trickled out of it down the tube of the speculum, and collected on the edge of the funnel. The urine was claret-colored, demonstrating at once the renal source of the hematuria. He could not introduce one of his long flexible renal catheters into the ureteral orifice, as he was unable to control the end of the catheter through the long, narrow speculum.

The examination was rendered difficult throughout by the insufficient control of the instrument afforded by the small handle; he also found that the tube of the speculum was longer and a little smaller than necessary.

It is a satisfaction to the author to be able to show in this report that his expectations have been realized, and he hopes at a later

date to present a fuller account of the methods of examination, with a description of a variety of better instruments for the purpose of exploring and examining the bladder in men. If we can succeed in doing away with the electric cystoscope by substituting a simple, direct method of examination for an expensive, complicated, and even dangerous instrument, the gain will be great. His direct method of examining also admits of direct methods of treatment. He could, for example, have cut or burned through the pedicle of a papilloma at the base of the bladder with almost the same facility with which he was able to inspect it.

THE TREATMENT OF HEMORRHOIDS BY INJECTIONS.

The treatment of hemorrhoids by the injection of carbolic acid and glycerin, mixed in various proportions into the substance of each pile by means of a hypodermic syringe, was first used by American surgeons. S. G. SHALEETA, of the Kieff Jewish Hospital, in a reprint from the *South Russian Medical Gazette*, Nos. 18, 19, 20, 21, 22, 23, 24, 1897, has modified this method by using pure liquid carbolic acid, injecting each pile with a Pravaz syringe to a certain degree of fulness, and completing the operation in one sitting. Two, three or four syringefuls of the acid are injected according to the number and size of the tumors. For external piles, he uses a mixture of two parts of pure carbolic acid to one part of a two-per-cent. solution of cocaine. Even if four syringefuls of this mixture are injected the quantity of cocaine is not sufficient to cause dangerous symptoms. As a matter of experience only a few drops should be injected where we have to deal with external piles, the syringe being introduced through the mucous membrane, and not through the skin. The history of sixty-nine cases treated in this way is given, and the results in all cases were highly encouraging. When the piles shriveled up and separated, the surface presented was similar to that produced by the operation for ligature or the clamp and cautery.

The advantages which the author claims for this mode of treatment are: (1) Absence of marked pain during the injections; (2) no necessity for anesthesia (this is a great advantage in old and feeble patients, and those exhausted by repeated hemorrhages); (3) little risk of suppression of urine following this operation; (4) no loss of blood during the operation; (5) no necessity to keep the bowels quiet for three or four days after the operation, as is the case in other methods of operating.—*British Medical Journal*, Jan. 8, 1898.

Correspondence.

LONDON LETTER.

BY RAYMOND CRAWFURD, M.A., M.D. OXON., M.R.C.P. LOND.

Influenza has again awakened from its temporary slumbers, and has reasserted itself in a mildly epidemic form in the metropolis. At present it is curiously localized to the outskirts and has not visited central London with any degree of severity. For all our talk of a specific microbe, each year finds us as ignorant of the origin and of the prevention of the pestilence "that stalketh in darkness." This certainly cannot be attributed to any lack of facilities for investigation of the disease, for it has never been completely absent from the metropolis for close upon ten years, and during this period has seldom omitted an annual recrudescence. Even the prevalent belief that its ravages are in some degree favored by mildness of season is a matter of considerable doubt. It is true that most of the epidemic extensions have occurred either in mild winters or in spring, but a notable exception was the severe outbreak in the spell of severe winter which will long be associated with February and March, 1895. However, while we are totally in the dark as to what is influenza and what it is not, we obviously cannot derive any useful information from mortality statistics. In the face of an epidemic of influenza it is impossible to decide how much of the mortality from diseases of the respiratory system is influenzal, and how much is of other catarrhal type. Certainly there is much too great a tendency to lay the whole category to the charge of influenza. Autumn has invariably been the period of greatest immunity, and next to autumn summer. This would suggest a microbe with a maximum fertility at a temperature intermediate between the lower ranges of winter cold and the higher ranges of summer heat. Last week a slight abatement of the death-rate gave a promise of better things, but unfortunately this has not been confirmed by the returns of the present week. Whilst medical

men are at their wits' end for some drug with a semblance of curative power, the lay public are never at a loss for an infallible remedy. This year it is phenol that has cured every one who has consented to try it. For some reason or another the mildly innocuous eucalyptus has never been dethroned from its high position in popular favor. I fancy the charm must be in the manifold modes of administration. It has been offered to me on sugar, on my handkerchief, on sawdust in a saucer, and I have even walked to my bedroom through a grove of eucalyptus trees.

A case of arsenical neuritis shown by Dr. Colman at the Clinical Society of London suggests some points of therapeutic interest. Briefly, the history of the case was as follows: From September 27 to October 28 (with the exception of six days, when the treatment was intermitted because of gastric disturbance) the child took fifteen minims of Fowler's solution three times a day for the cure of chorea. The chorea was cured at the end of that period, and we may charitably assign the cure to the heroic doses of arsenic. On November 10, however, she complained of weakness and tingling of the legs, and in the course of another week distinct foot-drop developed. In December, on readmission to hospital, there was complete paralysis of all the extensor muscles below the knees, with well marked reaction of degeneration. There was no alteration of cutaneous sensibility, but great tenderness of the leg muscles. There was well marked arsenical pigmentation in the neck and groins. By January 14 the child was rapidly recovering, having been kept in bed and treated with massage and electricity. That this was no special idiosyncrasy of the patient was borne out by Dr. Colman's statement that he had seen several such cases before, and other members had had a similar experience. It is interesting to note the period that elapsed between the cessation of the drug and the appearance of the symptoms. The therapeutic value of the case is that it sounds a note of warning against the heroic doses of arsenic, which are incautiously employed in the treatment of chorea. The small experience that I myself have had with these large doses has certainly discouraged me from resorting to them again. In one case a child of seven years was seized with violent colic after the first dose of fifteen minims, and I am half ashamed to admit that her chorea was cured by the single dose. In most cases, however, I have found no benefit from large doses, and much the same might be said of smaller doses. One wonders how arsenic succeeded in establishing itself as almost a specific for the cure of chorea. Peripheral neuritis is hardly likely to be of common occurrence from the medicinal use of arsenic, because gastric derangements usually indicate that the limits of tolerance have been reached, and lead to remission of its use. The patient in Dr. Colman's case was a girl twelve years of age.

In the *St. Bartholomew's Hospital Journal* Dr. Lauder Brunton discourses pleasantly on the subject of exophthalmic goitre. The main difficulty in rational therapeutics is to disentangle the symptoms which may be due to increased internal secretion from those that are due to primary nervous derangement. We quite agree with Dr. Brunton that the primary cause of the disease must be looked for in the higher central nervous system, but we would rather look in the neighborhood of the centers of emotion than about the medulla, as he suggests. Filehne's experiments on the restiform bodies have long since been discredited by a repetition of these experiments by Ferrier, in which none of the symptoms of exophthalmic goitre ensued. Moreover, the verdict of clinical experience is notoriously in favor of such general measures as promote rest and tranquillity of mind and body, aided by such drugs as restore tone to the disorganized nervous system. Most physicians have exhausted their patience and their repertoire of drugs in the attempt to alleviate some or other of the more obvious symptoms of the disorder, and ultimately fall back on such general remedies as we have indicated. Dr. Brunton speaks with some degree of certainty of the existence of increased secretory activity of the thyroid gland. This is hardly in accordance with what is found in glands that have been removed either by operation or after death. It is true that the secreting surface of the vesicles of the thyroid is very markedly increased, but my own experience of some dozen glands has been that the secreted substance in the vesicles is remarkably diminished; and this has been confirmed by many other observers. Also the injection of thyroid extract into the circulation produces an effect on the heart and vessels exactly opposite to that which we find in exophthalmic goitre. Such injections lower blood-pressure by increasing the calibre of the arteries without any obvious effect upon the heart. Lauder Brunton speaks hopefully of suprarenal extract in the treatment of exophthalmic goitre,

exerting as it does so powerful an influence on muscle tissue in general and particularly on the muscle of the circulatory system. He himself had seen good results from its employment in a single case. Of course in a disease which is so liable as exophthalmic goitre to periods of temporary improvement apart from any treatment, it must needs be fallacious to draw any conclusions from a single case. We have ourselves been signally disappointed in several instances, and we fancy that this is the general experience. All the animal extracts in turn "have their day and cease to be." Thyroid extract was employed for a while by physicians in defiance of their belief in a thyroid toxemia, and now and again recoveries were reported. Then thymus extract was given a trial, accidentally in the first instance, and passed through the same stages of promise and disappointment. Quite recently Dr. Hector Mackenzie has shown pretty conclusively by a tabular statement of results that we can look for little or no assistance from thymus extract. We conclude that suprarenal extract will shortly go the way of its predecessors. There is, however, still in this country a great disinclination to throw the toxemic theory overboard, and as yet no one has been found to attack the cervical sympathetic on the lines laid down by Jaboulay and Abadie.

The Royal Medical and Chirurgical Society has followed up its discussion on the Prevention of Enteric Fever by another discussion on Immunity and Latency after Operations for Reputed Cancer of the Breast, which promises to be of some interest, as most of the leading London surgeons are taking part. The discussion was opened by Mr. Marmaduke Shield, who satisfied his audience (1) that operative interference was justified by the amount of cases in which recovery was complete, and (2) that even by the old so-called "incomplete" operation the results were very much better than was generally supposed. For the rest the discussion drifted very much into an apotheosis of the "incomplete" method by the older surgeons as against the "complete" method—Halsted's operation—as commonly practised by the younger generation of surgeons. Mr. Bryant objected to the term "incomplete" as suggesting some omission on the part of the surgeon. He believed that the mortality from the method of clearing out the axilla and removing the pectoral fascia in every case was greater than that of the more limited method, the operation being too extensive for old subjects to endure. Whether this be the fact or not, there can be little doubt that such would have been the case prior to the introduction of antiseptics. Mr. Bryant also objected to the completer operation on the ground that recurrence was often not in the axilla nor in the line of the lymphatics; but though this may occasionally be the case, there can be no doubt, as Mr. Watson Cheyne has conclusively shown, that in the large majority of cases recurrence does occur along the routes of lymph flow, and that the best way to prevent this is by removal of the axillary glands, of the pectoral fascia, and more or less of the pectoral muscle. The objection to interference with the pectoral muscle is the subsequent limitation of the movements of the arm, but Mr. Butlin was inclined to attribute this more to the condition of the integument than of the muscle. It is difficult to define what "cure" is. Many of the speakers objected to Volkmann's three-year limit as the test of cure, because recurrences had taken place at greater periods of time. But after all the essential question is the prolongation of the patient's life, and it would be cruel to disadvise an operation that held out a good prospect of an extended term of years, even in face of the possibility of a later recurrence.

A good deal of discussion has been devoted lately to the dangers and uses of erythrol tetranitrate, which not long since was recommended by Bradbury for relief of the paroxysms of angina pectoris. An accident has recently occurred from the explosive property of the compound. Like other polyatomic organic nitrates, the erythrol tetranitrate detonates when roughly struck, but Bradbury states that it can be rubbed up in a mortar without danger, if ordinary care is used. The melting point of the substance is 142° F., and it does not undergo decomposition at this temperature. To produce explosion, it must be rapidly heated to a much higher temperature. In the case alluded to erythrol tetranitrate was combined with lactose, and Bradbury attributes the accident to its union with a readily oxidizable substance. Martindale has supplied a good deal of useful information as to the pharmacy of the drug. He found that it could be readily exploded by striking it after heating it to 130° F. Like nitroglycerin, it is soluble in fats and oils, and for the preparation of tabloids a stable solution could be obtained in the fat of chocolate. Neutral fats and oils when gently

warmed dissolve one-fourth of their weight of erythrol tetranitrate, but on cooling some of the substance crystallizes out. The chocolate tabloids do not detonate, as the fatty coating appears to act as a protective, and if an excess of fat be used, they can safely carry a considerable amount of the crystals. Martindale summarizes in a letter to the *British Medical Journal* the conditions in pharmacy that render the tetranitrate more explosive as follows: (1) He finds that if a little be heated on platinum foil it deflagrates with a flicker; (2) a trace triturated violently in a porcelain mortar does cause slight explosions; (3) mixed with a little lactose he could not explode it by striking it with a hammer at ordinary temperatures, or even after moistening the mixture with spirit; (4) a trace of an oxidizing agent such as silver oxide, mercuric oxide, potassium permanganate, potassium chlorate, or potassium nitrate, as well as reducing agents such as reduced iron, charcoal, hypophosphites, pyrogallol, morphine, and creosote, all seemed to render erythrol tetranitrate more explosive by concussion.

Abundant evidence of the therapeutic efficacy of the drug is forthcoming; indeed, in some cases it appears to be more persistently effective than nitroglycerin. The tabloids are more or less pungent to the tongue. The moral of the unfortunate accident is to deal gently with preparations of erythrol tetranitrate.

In the January number of the *Practitioner* there will be found some useful remarks by Sir William Broadbent on the Treatment of Dilatation of the Stomach. When the stomach tube is used, as it always should be when there is such accumulation of contents as to lead to copious vomiting, he suggests that the best time for using it is the evening, as it helps to secure a night's rest. Beyond the usual dietary restrictions for the relief of gastric distention, he recommends a tumblerful of hot or cold water night and morning, and half an hour before the principal meal. The hot water seems to stimulate the muscular coat of the stomach to contract so as to expel the gases that stagnate and passively distend the stomach. He finds the most suitable beverage in many cases one or two tablespoonfuls of brandy or whiskey in a claret glass of hot water towards the end of lunch or dinner. Of drugs for relief of overdistention he highly recommends a combination of sodium bicarbonate 20 grains, sodium sulphocarbolate 7½ grains, tincture nux vomica 7½ to 10 minims, with sal volatile, tincture of chloroform, and peppermint water, or other carminative, three times a day, rather nearer the next meal than the last, morning, afternoon, and near bedtime. This he replaces in a few days by an acid tonic with pepsin taken immediately after meals, retaining the evening dose only of the alkaline carminative. As the dilatation yields to treatment, measures should be set in train to deal with the catarrhal condition of the mucosa, or the atony of the muscular coat that has been the cause of the overdistention. When the atony is part of a general neurasthenic condition he advises a pill containing arsenous acid and sulphate of strychnine, one-twenty-fourth grain of each, with extract of calumba, gentian, or anthemis, with papain or pepsin if necessary, and rhubarb or aloin if constipation is present. Treatment of gastric dilatation may often be conveniently initiated by moderate purgation with calomel or blue pill combined with colocynth or rhubarb.

BERLIN LETTER.

By James J. Walsh, Ph.D., M.D.

The most interesting thing in therapeutics in Berlin for some time was the announcement that a department for the treatment of rabies by the Pasteur method was to be added to the Institute for Infectious Diseases here. Medical sentiment generally at Berlin, under the lead of Professor Koch and his school, has always looked with disfavor on the Pasteur treatment. The rest of Germany takes its cue, to a great extent at least, from here, and so while the English had come to acknowledge the value of the treatment, and the Italians had taken it up, and finally the Russians were enthusiastic over it, medical opinion this side of the Rhine would not listen to it at all.

It is the late International Congress, or rather their visit to the Russian institutions, that seems to have finally convinced the Germans that they were perhaps obstinately opposing a great therapeutic method. The discovery and development of the treatment of rabies by the injection of the desiccated spinal cords of rabbits, in whom the disease has been produced by inoculation, is absolutely empiric. It is absolute empiricism, too, in that domain where self-deception, if we are to read medical history aright, is easiest — the realm of applied therapeutics. No wonder that the carefully scientific Koch, and

the long since therapeutically disillusioned German medical mind, should have opposed. But the wonderful intuition of the genius of Pasteur seems to have led him aright through even the uncertain mazes that lead to a new biological therapeutic method.

The Russian statistics in the matter seem to prove beyond a doubt the efficacy of the treatment. They are the most favorably situated for observations, since lyssa is endemic among the wolves of the vast plains of the south—the Russian steppes. Their bite gives rise to the most virulent and rapidly fatal form of the disease. Their well known habit of jumping at the face of their victims gives the most fatal form of hydrophobia known; the richness of the lymphatic absorbents here, and the closeness of the nerve centers, where the virus of the disease is known to be reproduced, constitute most unfavorable factors for the prognosis of these cases. Yet it is from such cases that the Russians have gathered their favorable statistics.

The department for the Pasteur treatment here is said to be only experimental as yet; an appropriation of only about $1000 is made for it. It is clear, however, that the principle of the treatment is admitted and its importance acknowledged. A corresponding revolution in medical opinion can be looked for now confidently throughout Germany and among those for whom German medical thought is the only representative of what is best in medicine. This will include, I suppose, a number of American skeptics as to the Pasteur method.

Professor Heubner, the distinguished professor of children's diseases here, said some interesting things in a talk on the serum therapy of diphtheria the other day. The children's wards at the Charité, like most of the rest of the old hospital, are extremely unhygienic. They were never meant for modern medical methods at all. Perfect segregation is almost impossible owing to the arrangement of the buildings. As might be expected, children's diseases easily became epidemic. Diphtheria contracted in the hospital was of rather frequent occurrence. Some time ago Professor Heubner began to give prophylactic injections of diphtheria serum to all the children under his care, for the purpose of keeping them immune to the disease. This was continued for nearly six months, with only one suspicious case observed that originated in the house. That had very light symptoms as of an ordinary angina, and though the diphtheria bacillus was demonstrated by cultures to be present in the throat, Professor Heubner is inclined to think it one of those cases where the almost ubiquity of the diphtheria bacillus allows of its demonstration, though it is not etiologically concerned in the condition under observation; just as, after all, it has been found by such distinguished observers as Raux and Yersin in perfectly normal throats.

After a while objection was made to this wholesale injection of diphtheria serum, because it was unusual and smacked too much, to certain of the more conservative directors, of experimentation upon the little patients. The immunizing injections were accordingly discontinued. In six weeks three cases of undoubted diphtheria had developed in the wards, though needless to say every precaution had been taken to exclude it. Even the conservatives were convinced. The injections were resumed. They have had no diphtheria develop since, though that is months ago.

About 200 antitoxin units are given as an immunizing dose. The immunity conferred lasts, according to Professor Heubner's observations, almost exactly three weeks—twenty-one days being the average in a number of cases observed. The practical development of immunization here was bound up with all the more difficulties, because it is here that the famous Langerhans case occurred. The prophylactic injection of the child of Virchow's assistant was followed by its immediate death. No medical man now considers the serum to have been primarily responsible, but the case threatened to seriously disturb the advance of diphtheria serum therapy for some time. It is still so well remembered in Berlin that few families in private practise will, with a diphtheria case in the family, consent to the immunization of the other children, even though strongly advised to it by their attending physician. Professor Heubner says that he always recommends it now, and has had most excellent results from it. Gradually, he thinks, the prejudice will entirely disappear, as it has already in many families because of the success of immunization.

In Professor Heubner's clinic children with measles are always given an immunizing injection of diphtheria serum as part of the routine treatment. Since they have begun to do this, they have had none of the disagreeable and often dangerous cases of measles-croup, which occur so often in run down children.

As to the sequelæ and complications of serum treatment here they should be seen very often if anywhere. They are not frequent. Some children have an idiosyncrasy, however, and the injection of animal serum is followed by an urticarial rash. This may appear immediately after the injection, or not for two to three weeks, and is sometimes very obstinate to treatment. As the serum is made stronger—*i.e.*, as a smaller quantity of liquid is made to contain more antitoxic units, and so less and less animal serum has to be injected—these accessory effects of the serum become rarer and may be expected in this way eventually to entirely disappear.

Professor Heubner considers that Behring's expression some time ago, that 600 antitoxic units would be sufficient for any case, does not hold for very severe cases. Here they inject at least 3000 antitoxic units where lesser amounts fail to give relief in a reasonable time. Larger amounts, too, they have used, but as a rule where 3000 units does no good, higher amounts—6000 to 8000 units—also fail. Cells are so paralyzed in their functional activity by the amount of toxins present in such cases that even when these are neutralized by the antitoxin, the cells fail to regain their quondam function.

In the cases where the disease is already four to five days old when the injections are begun, the antitoxin is not the specific that it is when taken earlier, but there is no doubt that it does good. While they formerly saved only twenty-five to thirty per cent. of cases admitted to the hospital on the fifth day of the disease, the mortality of such cases is now not more than thirty per cent. altogether. In all cases other remedies besides antitoxin are used. In severe cases there are two special features in the therapy—the use of potassium iodide, ten to fifteen grains a day (what they consider here a large dose as a resolvent—*i.e.*, a membrane loosener), and sweating. A hot-air bath of three hours is given, followed by one hour's intermission; then three hours more. Professor Heubner considers this very efficient in relieving the system of toxins.

The antipyrin patent expires in July of this year, the limit of German patents being fifteen years and no renewals being allowed. It is thought that this will reduce the price of the drug by more than one-half. In the meantime a number of allied preparations have been made which have attracted considerable attention here. The last of these is pyramidon, and I have heard all of the prominent clinicians at least mention it, while some of them speak very highly of it.

Antipyrin is composed of two groups of atoms, the benzol ring and what Knorr has called the pyrazolon ring. Attempts at substitution in the latter ring have been made which would retain all the effectiveness of antipyrin and yet avoid its depressing effect. In this last preparation (pyramidon) all of the O atoms of the pyrazolon ring are replaced by nitro-methyl groups, giving phenyl-dimethyl-dimethylamino-pyrazolon. This, it is claimed, owing to the absence of stable O radicals, is especially efficient, while clinically it seems to be but very slightly depressing.

PARIS LETTER.

By A. R. Turner, M.D. (Paris).

The last two months have been marked by the death of two of the most eminent medical men in Paris—Tarnier and Péan. It would be hard to find two men more dissimilar in their most salient characteristics, Tarnier being essentially a man belonging to the Faculty of Medicine, scrupulous in his professional conduct, while Péan has always been somewhat of a free lance, as is indicated by his having been admitted to the Academy of Medicine only in 1887. Both men, however, owe a part of their reputation to their having invented instruments which are now universally known. Every one has heard of Tarnier's basiotribe, his special forceps, which though more complicated than Levret's is more physiological in its action, and his incubator for prematurely born infants. Péan's name is linked in like manner to hemostatic forceps, and to the various forms of the latter instrument which are used in abdominal surgery.

Péan was born in 1830 of well-to-do parents, his father being a miller of Châteaudun, a small town to the south of Paris. Tradition has it that his father, operated upon by a surgeon in Paris for some slight affection, was so much impressed by the size of the fee required that he then said to his son: "There is money to be made in this; take up medicine!"

Péan worked hard and was named first interne. His masters were Denonvilliers and Nélaton, with whom he stayed two years, and from whom he learned how to operate. While he was prosector of the hospitals, he gave instruction in surgery on the cadaver, and his energy and thoroughness have given

cause to regret that he did not follow up more the purely scientific part of surgery.

Once surgeon of the hospitals, Péan soon began a series of abdominal operations, which until then had been tabooed by the various scientific bodies. It was in 1864 that he performed the first successful ovariotomy in France. There were soon to follow a case of abdominal hysterectomy for fibroma, a splenectomy, and other operations of like nature.

Another point in technique which he applied brilliantly was what was described under the name of "morcellement des tumeurs," and which, applied at first to abdominal operations, was found to be of so much service later in the removal of the uterus by the vagina. Péan operated in a most masterful manner, and his calmness and astonishing rapidity have always been the subject of comment by those who saw him at work. He always wore a dress suit when operating, and it was really impressive to see him remove a tumor where there was much bleeding, and in case of hemorrhage quietly stop the flow of blood with one or two of his fingers.

Péan allowed his internes to operate, and considered them more as assistants than was the case twenty years ago. However, he made it a point to teach them in the first few months all that was necessary to insure their undertaking minor operations with ease.

In 1892, as he was obliged to leave the hospitals on account of his having reached the age limit, he established in the rue de la Santé the International Hospital, where he still kept on operating. He was in good health two weeks ago, but was taken ill rather suddenly with influenza and pneumonia, and died on the 30th of January, showing at the last the greatest calmness and resignation.

In a previous letter an account of the "affaire Laporte" was given, and it was stated that the defendant had been condemned to three months' imprisonment with application of the Bérenger law, which consists in suspension of the penalty inflicted by the court until an ulterior condemnation. Pinard, the celebrated accoucheur, has continued his efforts in behalf of Dr. Laporte, and has obtained letters from various representative men in midwifery, which he has had published.

In medical science bacteriology is always prominent, and as usual one or two new bacteria have been studied or analyzed very fully. Dr. Achalme, of Paris, demonstrated some time ago a bacillus which he discovered in patients suffering from rheumatic fever, and gave various means of differentiating it from other organisms offering the same morphology. Triboulet and Coyne have taken up the subject again and examined a certain number of cases of rheumatic fever with or without complications. They describe an elongated coccus, found in pairs, grouped in chains at times, presenting dimensions varying between 1.5 and 2 μ. This organism is characterized by its being anaerobic, is easily cultivated in bouillon or ascitic serum, is colored readily by thionine, but is not discolored by the Gram method. They look upon this germ as being the real microbe of rheumatic fever, whereas the bacillus of Achalme is to be found only in complicated cases. Their researches have, however, been criticized, and it has been objected that some varieties of staphylococci give the same reactions.

In an article published in the *Presse Médicale*, a paper recently started in opposition to the *Semaine Médicale*, so long the favorite journal of the medical practitioner in France, Dr. Landouzy, professor of therapeutics at the Faculty of Medicine, compares the relative value of antipyrin and quinine in the treatment of influenza. He begins by observing that the present epidemic of influenza in Paris is characterized by its asthenic and depressing forms, rather than by the painful ones seen in 1890. This special asthenia, which is so much seen, can prove dangerous or even fatal in old people, for instance, but if certain cases have proved more serious than others, it is sometimes due to an ill-timed use of antipyrin. It is unfortunately too true that antipyrin has come to be considered almost a specific in influenza, while it should only be looked upon as a means of alleviating pain. The result is that sometimes as much as two or three grammes of antipyrin are given. It would be unnecessary to call attention to this if this drug were incapable of producing untoward results, but it is only too well known that it depresses the nervous system, lowers the vascular tension, and produces peripheral vaso-dilatation, diminishes the oxidizing qualities of the blood, and by decreasing the blood-tension in the kidneys, lowers the quantity of urine excreted. It is thereby easily understood how pernicious are the effects of antipyrin, and how, far from helping the patient, its action is more or less similar to that of the disease. The moral

of all this is that antipyrin should not be considered as a drug specially indicated in influenza; what is really necessary is to strengthen the patient, to tone up his nervous system, so that alcohol, coffee, quinine, artificial serum are to be used.

Without exaggeration, Dr. Landouzy thinks that there are hardly any therapeutical indications that may not be fulfilled with quinine, the action of which is stimulating, tonic, and anti-infectious. As a conclusion Dr. Landouzy would choose quinine always, and only use antipyrin when obliged to do so.

Attention has been called of late to the use, or rather disuse, of those ancient therapeutic agents, bleeding, emetics, and blisters. Dr. Robin, agrégé at the Faculty of Medicine, speaks highly of them and considers that bleeding is certainly indicated in apoplexy, in some cases of pneumonia, and also where by a sudden depletion a certain quantity of toxins may be removed from the circulation, as in uremia. As for emetics, Dr. Robin has studied their action upon lung capacity, and the results of his investigations tend to show that respiration is notably increased, and the oxidation carried on in the body much more intense. Some care should be taken in the use of emetics with old people, but in certain cases of congestion or bronchitis they are certainly very useful. As for blisters, they would seem to affect the respiratory functions not so much by their chemical composition as by a reflex action leading to more intense muscular action in the respiratory muscles.

In surgery we must mention Dr. Chipault's communication to the Société de Chirurgie on scoliosis. The author considers that this affection should be treated somewhat as Pott's disease has been by Cabot. This treatment consists first of all in reduction by simple means, such as an apparatus for traction and extension, while lateral pressure is brought to bear gradually on the summit and extremities of the deformity. This removal of the deformity can be produced in successive stages or else accomplished forcibly under ether or chloroform narcosis, a course which is not recommended by Chipault. Once the scoliosis has disappeared, a plaster-of-Paris bandage should be applied similar to that used in Pott's disease, fitting well on to the body. In bad cases, various metallic hooks, similar to Malgaigne's hook, can be applied, and by their pressure on the bony projections they prevent a recurrence of the deformity. The result of this treatment would seem from the author's statements to be most successful, and in Chipault's estimation much to be preferred to the very long and unsatisfactory treatment by gymnastics.

The treatment of burns by picric acid has been the subject of some controversy, and in the discussion which took place at the Société de Chirurgie, the general opinion was that it was no advance on the usual methods. Dr. Walther communicated two reports of poisoning by picric acid in children. Dr. Brun also cited a fatal case.

An uncommon affection which has called forth quite a number of observations, on the subject being communicated, is subphrenic abscess. Two cases were seen last summer by Dr. Courtois-Suffit at the Beaujon Hospital, and operated on by Dr. Lejars in Dr. Theophilus Anger's service. This disease, which used to be well-nigh fatal, offers at present a very much improved prognosis.

Dr. Courtois-Suffit states that the symptoms observed are those that are seen in pus formation, and moreover tympanism in the right epigastric region with tumefaction. This tympanism is replaced by dulness in its lower half, when the patient assumes a sitting position. This affection is caused by perforation of the stomach or duodenum.

The first case was operated on by incision on the right of rectus muscle and subsequent parietal suture, and was drained and washed out at first every other day. The patient recovered. The second case, a woman thirty-nine years old, was also operated on by Dr. Lejars. Though there was improvement the first two days, she died the third day, and on examination an abscess near the spleen communicating with the stomach was found. As to the abscess which had been opened, nothing had occurred to cause death. These abscesses differ from others of the same region by the fact that they are in communication with the stomach, which presents an ulceration. They should be incised freely, and the mortality has thus been much reduced.

ROME LETTER.

By A. Dillon Carbery, M.D.

With unexceptionable weather and the presence of an unusually large number of visitors, the season in Rome promises to be of the gayest; yet in spite of its attractions and the great sanitary improvements of the last ten years, the city still suffers, unjustly one

would think, from a legendary reputation for unhealthiness which prevents its recognition as an admirable health resort for certain classes of invalids.

We are always glad to note the gradual dissipation of old prejudices, and certainly the legendary unhealthiness of Rome is amongst those superstitions which it would be to the common weal to dispel. A recent publication of the scientific press, namely, Dr. Mendini's Hygienic Guide to Rome, translated and edited by Dr. John J. Eyre, who practises here, is a sparkling retort to the maligners of the Eternal City. So far back as 1870 Baccelli was earnestly laboring to put an end to what he calls "a calumny which struggled not only with truth, but with the divine beauty of our sky." Following in these worthy footsteps Dr. Mendini, by careful reference to sanitary reports and a clever summarizing of mortality returns, meteorological charts and scientific documents of a like nature, establishes the conclusion that Rome is not only healthy, but has undoubted merits as a health resort. Curiously enough, the author in his preface describes this conclusion as altogether unexpected, for the reason that he himself at the outset of his inquiries suffered from the common prejudice that the city was not completely healthy. Referring to this interesting little book, we find that Rome holds the premier place for sanitary merit amongst the cities of Italy, and although it cannot claim superiority over all the other large capitals, it certainly takes precedence of some. Thus, for the ten years 1884 to 1893 the death-rate from all causes in Rome exceeds that of London, Paris, and Berlin, whereas it is lower than that of New York, St. Petersburg, and Vienna. In 1895 the death-rate of the resident population was only 17.3 per 1000. As to the malarial myth, it is disposed of in a word by simple negation. Malarial fever does not exist in Rome. Dr. Mendini admits, indeed, that deaths from malaria do occur in the city, but "The deaths indicated in the statistics all appertain to the agricultural population, who contract the disease in the Pontine marshes and in the other mephitic plains of the Agro Romano, and afterwards are admitted for treatment in the Roman hospitals. Amongst the population resident in the city there is not a single death from malarial fever."

When in imperial times the plebs clamored for bread, the patricians would offer games in the Colosseum and gladiatorial fights as a palliative; to-day, when the corner in flour maneuvered by the millers has led to riots and disturbances, and the great increase in the price of bread to an excitation of popular feeling which may at any moment lead to serious results, we are gratified here in Rome by a fierce encounter between Professor Celli of the Instituto Igienico and the Belgian Integral Bread Company. Weight against wit—a barbarian against a trained fighter from Urbino. The Belgian firm, offering whole meal bread at a much lower price than the bakers, is doing good business and intends to extend its operations, although established but a few weeks. From the first day of the opening of the bakery Professor Celli had condemned the bread on *a priori* reasons, stating that the antispire principle (which consists in disintegrating the cortex of the grain by a series of spiral knives interlocked) could never render the husk digestible, and that the bread was unwholesome. A violent polemic between the company and the professor was the result, in which the old controversies of whole meal or integral bread were all rehearsed. As a final note Celli published in the *Nuova Antologia* (the Italian "19th Century Review") a vigorous condemnation of the bread, which he described in the words of Vallin, of Paris, as good for dogs only, or vicariously for the constipated. Celli, who is undoubtedly a very earnest sanitarian, and as a deputy in the house is known to have socialistic leanings, explained to me in animated words the reasons for his action. Integral or whole meal bread, he says, is by secular tradition, universal experience, and in the light of modern research, wholly condemned, because, agreeing with Wiche, Menicanti, and Prausswitz, the husk of the grain is absolutely indigestible, as is the substance on the inner surface of the husk. The addition of these extraneous matters to the bread can be of no advantage and, acting as intestinal irritants, must prove harmful to the Italians, eaters of bread and fruit, amongst whom constipation is unknown and who would unquestionably lose much of the value of the food owing to its shorter stay in the digestive tract. Celli is persuaded that white bread is superior as a food to all other farinaceous comestibles, and with the addition to the paste of common salt and an acid phosphate (easily made by the baker) an ideal food is obtained. He further recommends as perfection bread made from a mixture of seventy-three per cent. wheaten flour, twenty-three per cent. flour from Indian

corn, and about four per cent. of flour made from beans. Celli's bread is palatable enough and highly nutritious, but has never been accepted by the proletariat for undefined reasons, possibly from the waywardness of nature that often dislocates useful from agreeable.

There has been of late a recrudescence of the old crusade against foreign medical men practising in Italy. As it stands, the sanitary law permits duly qualified practitioners of other nationalities to exercise their calling here, but only amongst their own countrymen, and it is forbidden to them to render any professional services to Italians. The question is not a new one. Twenty years ago an agitation was on foot to eject the non-Italian physicians, but it produced no practical result. Last spring a deputation of the delegates of the Order of Doctors appealed to the Minister of Public Instruction to formulate a project of law to alter Article 23 of the sanitary law under which hospitality is extended to our profession. To this demand the minister gave but little hope of ultimate satisfaction; and when the matter came before the Superior Council of Health it was deemed inexpedient to alter the statute, having regard to the possible economic loss which the country would sustain owing to a decrease in the influx of foreigners. Matters stood thus when the congress of the delegates of the Order of Doctors met here last October. At the first meeting the question was again raised, Santini, Bossi and others making a vehement attack on the foreign practitioners, whose numbers were stated as being 1500. It was proposed by Bossi that the government should be appealed to to cause a revision of the law in the direction of protecting the native practitioner and putting Italy on the same footing, in this respect, with the Continental powers. It was argued that free trade, though unquestionably beautiful in the abstract, was inferior to protection, where the latter was adopted by all the Continental nations. Some of the orators were more vigorous than academic in their denunciations of the "stranieri," but these were few in number and not from the ranks of the more worthy.

Durante, who is a member of the Senate, offered to carry the motion before the houses of Parliament, but as the voting, curiously enough, was not unanimous, he withdrew his proposal. A few days ago Santini, who is a deputy (the number of medical men in the Italian houses of Parliament is large and they are a significant body) and who seems to be the principal instigator of the agitation, raised the question in Parliament. The Minister of Public Instruction answered the interpellation by demonstrating that the figure 1500, as representing the number of foreigners, was inaccurate, and that in reality they did not exceed 100 for the whole of Italy, concluding his remarks with the usual assurance that the matter would be attended to in the future. What will be done eventually it is impossible to surmise, but as in the domain of Italian politics the future is often illimitable, it is sufficient for us to note that the agitation exists, but that it is not actively fostered by the great heads of the profession nor encouraged by the Government. We should be the last to believe that the presence of the foreign physician adds an additional charm to the delights of sunny Italy, yet we may be pardoned in thinking that the residence here of the "free lances of Esculapius," as Santini is pleased to dub us, must do something to increase the popularity of Rome, at least as a health resort.

Away from these dusty polemics, the work of the schools and the studies of the laboratories proceed with calm and undisturbed tenor. Dr. Fiocca, of the Santo Spirito Hospital, gives us a simplified process for the serodiagnosis of enteric fever. He spreads a thin layer of fresh broth culture of the bacillus typhosus upon a cover-glass, and into this he conveys from a needle point the smallest quantity possible of blood procured from the patient under observation. Thus the amount of blood mixed with the culture broth is less than that recommended by Widal. The cover-glass is then placed on a hollow slide, as for hanging drop specimens, and may be secured with vaselin. The reaction, says Dr. Fiocca, occurs within ten minutes, or at most from twenty to twenty-five minutes, never after thirty minutes, and it is complete when the characteristic bush-like grouping of motionless bacilli is observed. In the case where a few free moving bacilli are seen between the groups the reaction is considered to be also complete, though of course not so clearly, and the test regarded as confirmatory. The process is quite as reliable as that of Widal, with the advantage of being more easily carried out at the bedside and in private practise.

Dr. De Marsi, director of the gynecological department of the Polimambulansa, of Bologna, reports an extraordinary case of

supplementary menstruation following total vaginal hysterectomy. The patient, a young woman, was operated on in November, 1896, for chronic metritis and double pyosalpinx, probably gonorrheal. A complete hysterectomy was performed and both ovaries with appendages removed. After the operation the patient presented the phenomenon of an ectopic menstruation from the bladder, which recurred at the regular periods. The microscopic examination of the urine during the menstrual period gave the following constant results: (1) Red and white blood cells in abundance; (2) epithelial cells from the bladder walls; (3) no elements that could be traced to the kidneys, pelves, or ureters. The chemical and microscopic examination of the urine is absolutely negative during the non-catamenial period. According to De Marsi the case is wholly without parallel.

Capparoni, the Medico Primario of the Roman hospitals, records some brilliant results in the treatment of Pott's disease of the spine with injections of corrosive sublimate. He quotes in all four cases, of which three are cured and one remains under treatment. The first case was one of cervical disease with a marked gibbosity corresponding to the sixth and seventh cervical vertebræ, and some lordosis of the three first dorsal vertebræ. One centigramme of the sublimate was injected daily into the back of the patient, who was discharged after five months' treatment apparently cured. Two years later, however, the disease showed itself again, and the patient was readmitted and subjected to the usual treatment by fixation under another physician. This was continued for two months, but without success, when the injections were recommenced at the suggestion of Capparoni and the patient discharged cured, remaining in excellent health since then (December 30, 1895). The second case, also cervical disease, after 140 injections was discharged cured, showing no spinal deformity, and still enjoys excellent health. The third case had a dorsal deformity, which yielded to 500 injections. The last is still under treatment and is much improved. Dr. Capparoni concludes his observations by stating that in these cases, if we exclude syphilis, we must assume a diagnosis of tuberculosis, and as he is not able to believe that the latter could be arrested by the action of mercury, we must therefore look for the cause of the spondylitis in some other pathogenic agent which is amenable to the therapeutic action of mercury.

A new double salt of mercury has been prepared by Salvatore Arrosto, the chemist, at the suggestion of Miceli, who is using it with excellent results at the Grand Civil Hospital, for the hypodermic cure of syphilis. Miceli is opposed to the usual preparations of mercury; the benzoate, the bichloride, the biniodide, the succinate, the cyanide — all these, he says, are painful to the patient, giving rise to swellings and indurations at the site of puncture. They are so painful, even with the addition of cocaine, as to be, in some cases, an obstacle to the continuation of the treatment. He is also persuaded that the addition of cocaine or morphine to the injection leads to a double decomposition which renders the injection solution of no value. The new salt proposed and used by him is a double hyposulphite of sodium and mercury, which is twice as soluble as the acetate and nearly five times as soluble as the bichloride. One cubic centimeter of the solution, which is the dose, contains one centigramme of the salt, equivalent to about nine milligrammes of metallic mercury. The injections are administered every other day, and in very severe cases daily; they give little or no pain and cause no induration. The hyposulphite of soda reacts favorably on the patients. Many successful cures are scored for the new Sal Micheli, as it is called. Stomatitis is rare as a consequence of the injections, if administered on alternate days.

THE TYPHOID EPIDEMIC IN MAIDSTONE, ENGLAND.

By Dillon Carbery, M.D.

The personal reminiscences of one who had the privilege of taking a small share in the work during eight weeks of the Maidstone epidemic may not prove uninteresting, although they can lay no claim to be regarded as scientific records.

Viewed as an experience, the episode was most instructive for all concerned, but was not devoid of painful impressions. For the doctors there was a superabundance of hard work, for the authorities anxiety and heavy expenses, and for the people the painful illness and sad family losses. Yet there remains this advantage, that an object-lesson has been afforded such as must surely tend to the advancement of sanitary truths, and eventually to the betterment of the afflicted town itself.

We cannot hope for any final report on the

epidemic for some considerable time; for although it is said to be moribund, the malady is evidently dying hard, and no doubt close upon 1900 cases will have been recorded by the time these lines are in print.

Situated as it is in what is called the Garden of England, the chief town of Kent has many charms and natural graces, not the least of which, until lately, was a low death-rate. About the middle of August, 1897, in hop-picking time, an outbreak of diarrhea, not on a very extensive scale and principally affecting the children, was noticed, and attributed to the unusually dry summer. A few deaths occurred, but as September began the health of the town seemed quite restored. One isolated case of enteric fever had been observed, but this was supposed to have been contracted elsewhere.

About September 10 the medical men found that they were getting very busy, and as time went on they were surprised to see their daily work increasing enormously. As yet no one thought of enteric; some spoke of influenza, others were puzzled. After a few days of general astonishment at the extraordinary numbers of patients claiming their care the truth gradually became manifest. On September 16 thirty-eight cases had been notified, and four days later the epidemicity of the fever was fully recognized in a total of 327 notifications. It was then that the doctors, knowing that there must be a great increase in the number of those affected, telegraphed for help and ordered nurses from London and elsewhere.

The urban council meanwhile was waking up, but was not thoroughly roused until convinced by the medical officer of health that the cause of the evil was a contaminated water-supply. The town was supplied from three sources: from the chalk hills of Boarley and Cossington in the north gravitated two of these supplies; and the third was pumped into a reservoir from Rag-stone Springs, three and a half miles to the south-west. In this—the Farleigh—district two of the springs were at no time above suspicion, and a rapid examination revealed a sorry state of affairs. The Tutsham-in-orchard Spring, used as a watercress bed (!), was the recipient of the drainings of a privy hard by! The Tutsham-in-field Spring had been polluted by hop-pickers.

The latter spring—now known to have been the original source of the poison—was situated in a meadow and rose within a foot or so of the surface, above the layer of impermeable clay. Through the meadow ran a road unprotected by hedge or fence. Here in August an encampment of hop-pickers was allowed to take up its position, and a very slight knowledge of the hop-picker or his habits makes it clear that pollution of the worst kind would result. Given the fact, as demonstrated later, that enteric fever did exist in this very encampment, and we have as complete a tale of water-borne fever as was ever told, to which it would be superfluous to add that the filter-beds for the water of this area had not been in use for some time.

These facts were of course not known in full during the first days of the epidemic; some indeed denied that the Farleigh water could be at fault, as there were no cases at the Barming Lunatic Asylum in the suburbs of the town, and supplied with the same water. No sooner was the objection made than the outbreak of fever amongst the inmates of the asylum gave it the lie, and the peculiar distribution of the cases, which were confined almost exclusively to the area supplied with the tainted water, made the impeachment of the supply a certainty. In one street, for instance, where on one side Boarley water was used, there were no cases, whereas the opposite side had as many cases as houses; and in a certain terrace the only house to escape the sickness used the water from a private well in the rear, whilst the others drew theirs from the contaminated mains.

And still the cases became more numerous; soon 600 was reached, and the town was in the greatest state of anxiety. About this time the work was heaviest for the doctors, as the district nurses had not yet been imported and the hospitals not organized.

In dealing with so large a number of patients and so serious a malady, much strain was put on the usual practitioners of the town, so they early sought help from outside. In the practise of the Mayor and his son, Dr. C. Pye Oliver, in which I was helping, the method of procedure was simple, and if somewhat laborious, certainly most satisfactory in every other way. Handy portfolios, octavo size, were made for us by the local bookbinders, fitted with strings so as to carry a large number of ordinary clinical charts. These books we took with us on our rounds, and a brief history of every fresh case seen was noted at once on a chart with the usual clinical observations and directions as to food, drugs, and stimulants. If after a few

days' observation the case proved not to be typhoid, the chart was put aside. Thus at any time the number of those under observation, the number notified, as well as a clear record of each particular case, was available. These notes were of further use in enabling us to form an early diagnosis, so as to report more rapidly and with greater certainty to the health office. Of course the work entailed in keeping these accurate memoranda in the midst of so much bustle was great, still it was counterbalanced by the possibility it gave each of us of keeping an intelligent eye on at least eighty synchronous cases. When the nurses came, our private charts were no longer of such primary importance, as charts were issued by the Emergency Committee and kept in the sick-room by the nurse in attendance.

Besides the note-book, each physician carried a bag containing a supply of clinical thermometers and emergency drugs. Where a doubtful case was concerned one of the thermometers was entrusted to the friends with directions to place it under the arm of the patient at a given time. These instructions were carried out quite easily even by the most unintelligent, and when the case was seen again the temperature recorded was a most valuable aid to diagnosis. This simple expedient is of evident value in cases where in ordinary practise enteric is suspected and the doctor is anxious not to alarm his patients or their friends by calling twice or sending a nurse.

Amongst the emergency drugs were tablets of phenacetine (four grains) and caffeine (one grain), which we found an efficient palliative for the initial headache; tablets of opium, of quinine, and hypodermic solutions of caffeine, strychnine, and ether. Lastly, we had a quantity of boracic acid in half-ounce packages; these we left at the houses with instructions to dissolve in one pint of boiling water and to administer from one drachm to one ounce, according to age, every two or three hours. This was an expedient resorted to so as to avoid the terrible stress of work at night in the surgery or office, where at first we were quite swamped by the unusual horde of people who wanted medicine. One of the most arduous tasks we had to perform was this attendance at the surgery; here the clubbers or contract patients assembled in force after 8 P.M., and it was difficult to keep them in order or to attend to their wants. Some indeed were falling ill with typhoid and wished to consult us; others thought they were and were no less anxious for advice. All wanted medicine. Three hours seldom sufficed to attend to all these people and to send out the drugs ordered during the day. For this reason we used the boracic acid in packages, and it saved a great deal of worry and needless work during the first great rush; as to its curative value I shall have a word to say presently.

Later on, when the nursing staff was complete, we had a series of post-cards printed. On the back were divisions marked for name and address, time of visit, temperature, pulse, respirations, and state of bowels. They were directed to us. Where a case was not seen for twenty-four hours the nurse in charge filled in the form and dropped it into the letter-box. If the case was urgent the card was sent by hand, and from the notes made a very clear judgment could be given as to the nature of the emergency. This precaution saved us a great deal of unnecessary visiting at night, which it was expedient to avoid, as the day work was so arduous that a good night's rest was a *sine qua non*.

Meanwhile the sanitary authorities were no less busy, and orders for the boiling of water and milk were promptly issued. The two suspected springs were cut off, and later the whole of the Farleigh supply. About September 22 a bacteriological inquiry into the condition of the water was entrusted to Dr. Washbourne, of London.

Still the Farleigh mains had not as yet been disinfected, and as there was much popular alarm, fomented no doubt by the warnings of the *British Medical Journal*, the whole system used for the supply of the tainted water was eventually sterilized with chloride of lime. Orders were issued to the inhabitants to open all taps at 11 P.M. on Saturday, October 16, and to close them again at midnight, leaving them closed until the following Monday at 6 A.M. Meanwhile Dr. Sims Woodhead, adviser to the Water Company, was busily employed in throwing one and a half tons of disinfectant into the reservoir, with the result that about 11.30 the disagreeable odor of chloride of lime permeated most of the houses. The germ-bane ran through too prematurely; for the water stored by us in the bath-room for washing purposes became so foul with the advent of the disinfectant that it had to be condemned for use and consigned to the drains.

During the temporary famine that ensued, water was supplied to the town in army carts kindly lent by the military authorities at

Chatham. What subsequently came through the taps on Monday morning was absolutely undrinkable, and the odor of chloride of lime was perceptible everywhere. Unquestionably the germs in the mains must have been routed in those thirty-six hours, for surely they would have preferred death to those pestilent fumes.

Nurses had been gradually drafted into the town by the urban council—some for the district, others for the hospitals. They were lodged at private houses and various institutes as guests or boarders; their numbers increased *pari passu* with the need for their services. We had not, as a friend from Canada suggested, one thousand nurses, but the total figure was not much under four hundred, including private nurses and those sent at the expense of individuals or public bodies. The nurses who were in the service of the corporation and engaged in district work wore a distinctive badge bearing their number. Twelve patients were allotted to each nurse, and to reduce fatigue it was so arranged that the cases of each lay close together—say in one street or on two sides of a block. Morning and evening they visited, taking temperatures, sponging, etc., performing such of the duties of head nurse as were possible under the circumstances. Special cases were seen oftener, and in the houses of these the nurses could usually be found by the doctor when on his rounds.

The friends of the sufferers became by degrees initiated into a sufficient knowledge of nursing and were able to assist the nurses materially; many indeed could interpret the charts, and the patients themselves would sometimes scan their temperature curve with a considerable amount of interest. In one instance a little lad of ten would cry so bitterly if his temperature went up that on one occasion when it reached 105° we were obliged to conceal the chart in an adjoining room, where it was kept for the rest of his illness.

In very severe cases where close attention was required, the medical attendant could requisition a night nurse who came on duty at 9 P.M. Of night nurses there was a most efficient staff, mostly recruited from the London Hospital Private Nursing Institution, and to their skilled care many patients undoubtedly owe their lives. The night nurses wore a badge like the others, but with a central disk of carved oak coated with luminous paint.

Volunteers also were not wanting, and amongst these the Volunteer Medical Staff Corps rendered valuable aid in attending, by night, to such male cases as were unmanageable through delirium.

To the Emergency Committee, a section of the corporation presided over by the medical officer of health, is due the credit of fitting up the emergency hospitals, of which no less than eight, with a total accommodation for over 250 beds, were installed within forty days of the outbreak. It was no light task to undertake, but the ingenuity of the committee soon transformed two or three day schools and as many mission rooms into charmingly appointed little hospitals, whilst a private house with the Salvation Army barracks adjacent was made to yield efficient accommodation for nearly seventy beds.

During the early days of the epidemic it was very necessary to get the severe cases removed, partly for the sake of better nursing and partly as a preventive measure; but when the district nursing was organized it was found more convenient and more beneficial to the patients to treat them in their own homes. The mortality during the first few weeks was high in the hospitals, owing to the fact that only the more severe cases were taken in.

As it was proved during the Worthing epidemic, the best results were obtained where the sick could be kept in their houses under the care of competent nurses.

Early in the epidemic the local soup kitchen, a charitable institution, became overwhelmed by petitions for beef tea and milk from the poorer classes of the afflicted, so to supply the needs of these the guardians of the poor opened a temporary relief station. The distribution of food necessaries for the sick was entrusted to the doctors and nurses, who carried order books for the purpose. This poor-law relief, intended only for the necessitous, was asked for and granted to the major part of the working classes, for a family that could not be called necessitous at ordinary times was reduced to poverty if the breadwinner was attacked or a number of the household were simultaneously affected. Milk, eggs, beef and mutton for broth, and all other medical necessaries, were supplied freely on the doctor's order. Several of these stations were established, and the demand at each did not slacken until the Central Relief Committee opened their stores in the Corn Exchange. Here were to be distributed the unlimited and varied presents sent to the town by sympathizers all over

England. To enumerate these would be to quote the list of a universal provider. One might mention *inter alia* a ton of arrowroot, between seven and eight tons of wearing apparel, and 30,000 bottles of mineral waters. We were given to understand that there was even a limited supply of coffins and tall hats. To add that such trifles as chartreuse, Benedictine, old cognac and choice brands of champagne were to be had in plenty seems almost superfluous. The distribution of these stores was presided over by a committee and directly effected by officials recruited from the ranks of the schoolmasters whose pædagogia had been emptied of scholars to be filled with typhoid patients.

It was an interesting sight to see the Corn Exchange crowded at all times with the friends of the afflicted seeking this or that requisite ordered by the doctor. Here was a tiny child struggling under her load of sterilized milk and beef broth in tins; there a brother carried a basket of mineral water bottles; some wanted eggs or coffee or brandy, others an ice-bag and a blanketful of ice. Nurses hurried in and out laden with toys for the children, books for the older ones, and garments for all; one carried blankets and sheets, another pillows and a bed-rest.

There could not help but be abuse in this general present giving, and indeed we were only amused to hear that one ambitious woman had succeeded in getting no less than eighteen blankets at different times, said blankets finding their way almost directly to the pawn-shop. This particular form of abuse the Relief Committee were able to prevent by marking all bed necessaries and articles of a like nature with a special stamp. Our poor patients wanted for nothing, for water-beds, bedpans, easy chairs, feeding cups, beds, bedding, linen and woolen bedclothing were all forthcoming; in a word, all the paraphernalia of a first-class hospital could be procured on the order of a medical man or member of the committee.

A friend who was passing through the town accompanied me one night on my rounds; he could hardly believe that the first house we visited (where there were four cases) was not a hospital, but only the house of a poor washerwoman. The scrupulous cleanliness and neatness of the rooms, the presence of the bright linen-clad nurse, the snow-white beds with charts above each, the tables for medicine and food, all helped to make the illusion complete.

To mention all that was done by the sanitary authorities would be to give the history of the epidemic in detail. We must not forget the public laundry, however, where all infected linen was sterilized. Special canvas bags were deposited at the houses of the patients, in which the sheets and clothing were placed, to be collected by special vans every day. It is interesting to note that no one in connection with this establishment contracted the fever. This was due, of course, to the fact that the infected articles were not handled at all by the employees, as the canvas bags were tumbled into large iron cradles, which were subsequently lowered by a chain into the boilers.

The cost of all these undertakings was said to be about £1500 a week. The relief fund amounted to about £3000, of which a large portion was collected in the borough of Maidstone.

As to the state of panic in which the inhabitants of the town were supposed to exist, the reports were greatly exaggerated. To a stranger there was but little evidence of that internal disorder suggested in the London papers. To one who knew the town, there were indeed many indications of unwontedness. The groups of nurses hurrying through the streets, the many and varied posters showing forth the efficacy of this or that food, drug, or preventive, or extolling the purity of some new table water, the printed warnings to the public headed "Typhoid Fever," and notices of the Relief Committee were a chronicle of the times for the observant. At the town hall daily could be read the list of fresh notifications and the growing number of deaths.

The streets, too, were unusually empty, owing to the timidity of the agriculturists; and the melancholy spectacle of six or seven funerals streaming in the same direction at the same hour was an ample commentary on the story of the town's disaster. In the shops trade was for a time almost at a standstill, and the constant topic of conversation was the epidemic and the mischief it was working. So keenly was this trade depression felt that the Mayor, himself a medical man, drew up a memorandum stating that visitors to the town need not fear infection in making their usual purchases. This notice, signed by the medical men, was displayed in all the shop windows and distributed through the country. Still visitors were few, and buyers in the market fewer still. Nor would they partake of anything edible. As a prophylactic, how-

ever, they consumed brandy incontinently, much to the delight of the publican, whose town-brewed beer was of course tabooed. The mineral water-makers issued large bills showing that their produce was made with boiled water, but non-local firms profited by the scare. It is on record that five tons of cobnuts, sold in the town, were refused by the consignee as being infective material! Hops in the same way was made unsalable because sent out in packets bearing the fatal word "Maidstone." The acme of the ludicrous was reached when a Liverpool firm in sending a check to a local bookseller requested that no receipt be sent back lest the poison should accompany it!

Still with all the good people of Kent took their troubles very stolidly, and in most cases buckled to and nursed their sick with energy and kindness if not with intelligence. A few cases there were where fear subverted natural affection. A certain man, for instance, sent back his wife to London (where she had been staying a few days) on the very day of her coming home stricken with the fever. On her return to the metropolis she was taken into hospital, where she did well, but her husband, curiously, contracted the fever and died in the first fortnight. It was of course impossible to get servants to help in those houses that were affected. In some childless homes the husband was obliged to give up his work and undertake the unwonted duties of nurse and housekeeper. It was not an uncommon thing for patients to be left unattended for many hours, and in one case I found a poor young woman who had not had any one to give her a drink for over twelve hours. In another house was found a small child alone in one of the up-stairs rooms; her father and mother had both been removed to hospital; she had evidently been forgotten by the neighbors, and was in a very pitiful condition of hunger and fright when discovered. A mother and her two daughters were attended for some days by a child of six; and the nurses reported a case where a man and woman recovering from influenza, with their ailing baby and a boy down with the fever, all shared the same bed. These were sad cases, no doubt; but one could not help feeling that there was grit in humanity when one saw a poor washerwoman sole nurse and servant to her three daughters, her son, and her husband—all abed with the fever.

Even in the midst of all this anxiety and desolation there were times when a humorous situation or an absurd malapropos lightened the tragedy with a little comedy and laughter.

Amongst what might be called the humors of the epidemic the following, incredible as they may seem, came under my own observation: On one occasion, when at the barber's, a man who occupied the adjacent chair stated that he had seen with his own eyes the typhoid germs in the water, and when asked to explain he assured the gaping audience that by the simple expedient of pouring a few drops of vinegar into a tumbler of water he was enabled to see the microbes crawling up the side of the glass! The opinions of the poorer classes as to the nature of the poison were even more extraordinary. One burly matron assured me that she knew all about typhoid, and with an air of authority expressed her conviction that it was due to a worm that grew in the body! Others, again, had strange tales to tell of the foul condition of the reservoir, and from a solitary eel and a few barrows of mud (which were actually cleared out when the reservoir was drained for inspection) they manufactured several tons of eels and many feet of refuse. Some stated that a dead horse had contaminated the water; others that it was the corpse of a baby, which by some was magnified into that of a woman and by other authorities that of a tramp. The climax of aggravation was attained when an elderly shoemaker confided to me his belief that the body of a nigger had actually found its way into the mains! In spite of these reports, and the repeated warnings and pointed notices of the sanitary authorities, some of the people persisted in drinking the water unboiled. Indeed, in the case of a row of cottages whose supply came direct from the rising main, the occupants actually petitioned the board of the water-works to restore the supply when it had been cut off.

These curious demonstrations of popular prejudice, including the precautions of a stranger who rode one night through the town with his face tightly muffled in a white pocket-handkerchief, though undoubtedly amusing, must pale their lights before the credulity of a family who actually caught in their sink and bottled a fine and large specimen of the bacillus typhosus. On arrival at their door on the eventful morning I was greeted with cries of the wildest excitement mingled with the pitiful wailings of two young patients abed up-stairs. I was alarmed at first, but when assured by two pale-faced girls that they had just caught it and put it

in a bottle, I could not restrain my laughter. They showed me a very large, horny centipede that had been washed out through the tap, and which they were convinced was the very germ itself. My two little patients were horrified into tears by the thought that their vitals were being consumed by an army of scaly reptiles of the same type. It took some time and many playthings to console them.

A very curious superstition was demonstrated to me by an old woman whose daughter had typhoid. When ordered to burn some rags, soiled by the dejecta of the patient, the mother refused to do so, as she had always heard that to burn any of the motions of a human being would inevitably lead to their death from a wasting of the bowels. I have subsequently heard that this belief is prevalent in Italy, more especially in Naples, and is also well known in Ireland. The ultimate disposal of sewage by cremation has, it would seem, some ardent opposers, who no doubt regard it as nothing less than wholesale murder.

As to the special features of the fever, it was decidedly of the text-book variety, presenting the usual varieties and but few abnormalities. Of the so-called abortive cases mentioned by Türgensen, I saw none. There were a few apyrexial attacks in which the temperature never touched 100°, and in one of which the curve of fever was only once about normal; in this case there occurred, on one occasion, alarming collapse. A case of the ambulatory type was demonstrated in a woman who confessed to all the symptoms, had a slight elevation of temperature, a most characteristic tongue and a copious rash, but was carrying on her usual occupations in the household and could only with the greatest difficulty be persuaded to accept treatment and physiological rest.

Amongst the most interesting abnormalities may be quoted a case (observed in hospital) where a genuine relapse followed after three weeks of complete convalescence.

On the whole, the prevalent malady was not of a mild type; relapses were common and the course of the pyrexia prolonged. Hemorrhage and delirium were frequent.

One of the most interesting features of the epidemic was the variety of rashes observed, the most puzzling being the scarlatiniform rash, coming on with a sudden rise of temperature, and identical with eruptions due to ptomaine poisoning from ingested foods.

The Tache Bleuâtre was not noticed, much to the credit of the cleanliness of the Maidstone people. Herpes, though rare, I observed in several cases with or without lung complication. Urticarial, eczematous and sudaminous rashes were plentiful. In one case a hard, papular rash not unlike smallpox showed itself, curiously confined to the palmar surface of the hands. The explanation of the incidence of these rashes we find in a report of the medical officer of health, which discloses the extraordinary fact that there are at least 4000 houses in the borough whose water-closets (save the mark!) are waterless and innocent of flushing appliances! The poisonous effects produced on the inmates of these houses, whose house-drains were little better than elongated cesspools, were only too evident, and no doubt helped materially in increasing the death-rate and number of the affected. The sanitary authorities recognized this fact early, and in every instance the house drains were flushed with the hose and disinfected with crude carbolic acid; but the inmates had become so lowered by the continuous inhalation of noxious gases as to become ready victims to the scourge or to succumb more easily if already affected.

Of enteric fever during the puerperium we had one case. The fever was in its second week when natural labor took place. The child was nursed at the breast by the mother, who attributed her discomfort to the usual phenomena of parturition. The infant showed no symptoms of typhoid, although the lying-in room was shared by a son aged fourteen, whose illness was of the same date as that of his mother. This boy was removed to hospital and the baby put out to nurse, the mother making an excellent recovery.

Amongst the complications thrombosis seemed the most frequent. Pleurisy was also noted, and in one case (out of fifty-six) orchitis.

The treatment adopted was varied, but in the main expectant. Antiseptics had their supporters, and amongst these the boracic acid treatment seemed to afford a certain amount of satisfactory results. It would be inexpedient to rehearse the polemics of this question of antiseptics, but one cannot help thinking that if *excessive* bacterial action is arrested by their use a point has been gained, adding to the comfort and chances of the patient. However this may be, boracic acid given in the manner I have already spoken of caused no unpleasant symptoms; it was readily taken and retained, and seemed,

speaking roughly, to lessen diarrhea, obviate abdominal distention, and generally to mitigate the course of the fever.

The milk diet was in all cases adhered to, and amongst other preparations humanized milk might be cited as being close upon perfection, more agreeable than peptonized foods, and more easily retained and assimilated. As substitutes for milk, whey with albumen, water and various malt preparations were adopted; but of the exclusive use of the latter I had no experience.

Of alcoholic stimulants a free use was made, in some cases in doses of from fifteen to twenty ounces in twenty-four hours. So general was the recourse to alcohol, indeed, that the wrath of the total abstinence faction was mightily aroused. Some amusing though vituperative letters to the press were the result, in which the abstainers, with the infinite authority of ignorance, condemned the doctors and predicted a mortality of over thirty per cent.

Of other stimulants, strychnine hypodermically gave the most grateful results in heart failure or respiratory weakness.

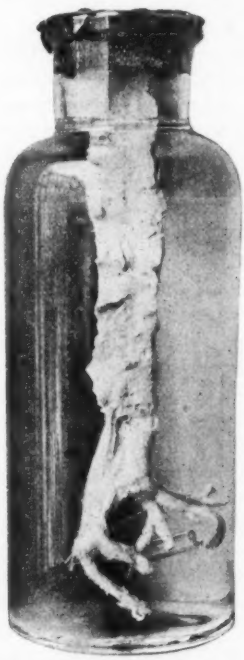
It was of course impossible to use complete hydrotherapeutic measures, as the full-length bath is not an accessory of the houses of the poor; tepid sponging, however, and cold or ice packs were used as occasion arose.

In comparison with other epidemics that of Maidstone can lay claim to the highest total of cases, with a mortality, if not the lowest, undoubtedly much below the average (December 11: Total cases 1885; mortality 7.5 per cent.). This low death-rate was due no doubt to the energy of the authorities, the skill of the nurses, the generosity of friends all over England who so largely contributed in kind and currency, and, not to be overmodest, to the improved training and more approved methods of the medical profession.

REPORT OF A CASE OF DIPHTHERIA INVOLVING THE LOWER LARYNX, TRACHEA, AND BRONCHI, WITH RECOVERY.

To the Editor of the THERAPEUTIC GAZETTE.

SIR: Mrs. H., aged eighteen, had a cold since December 1, and on January 7 lost her voice. On January 10 she called in Dr. Truitt, who found the patient suffering with some dyspnea and cough, and a temperature ranging from 102° to 103°. There was no deposit in the pharynx or on the tonsils at this time or subsequently On the 12th of January there was coughed up a membrane about three inches long. On the morning of the 13th I was called in consultation; the patient had great dyspnea and coughed up a second piece of membrane about two and a half inches long. Through the courtesy of Dr. McCormick, the city bacteriologist of Norfolk, a culture was made from this and found to be purely diphtheritic. The temperature remained about 102° to 103°, the dyspnea continuing. On the morning of the 13th of January 1000 units of the antitoxin of Parke, Davis & Co. was administered, stimulating treatment being maintained meanwhile. On the evening of the same day another 1000 units of the same serum was injected. The dyspnea was improved shortly after the first injection; the temperature rose to 104° and remained there until a few hours after the second injection. There was considerable nausea, and on the next morning (the 14th) the membrane shown in the illustration came away with relief of all the symptoms, the temperature fell, and the dyspnea was entirely relieved. The patient made an uninterrupted recovery and is now convalescent.



Thanks are due Dr. Gwathmey for mounting the specimen, and Dr. McCormick for making culture.

M. MORGAN, M.D.

BERKLEY, VIRGINIA.

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